JPRS 76455

19 September 1980

East Europe Report

SCIENTIFIC AFFAIRS

No. 683

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BRIEFS

NEW AIRPLANE--A new type of airplane designated L-410 will replace AN-2 airplanes used on air routes within Saratov Oblast, USSR. The L-410 was ordered from the USSR and developed by Czechoslovak airplane designers, making it more comfortable, faster and having a shorter takeoff and landing capability compared with the AN-2. [Prague LIDOVA DEMOKRACIE in Czech 26 Aug 80 p 2]

CSO: 2402

DATA PROCESSOR DESCRIBED

Sofia VUNSHNA TURGOVIYA in Bulgarian No 5, 1980

[Advertisement: "The ES 9004 Magnetic Tape Data Preparation Unit"]

[Text] The ES 9004 is designed for direct magnetic taping of keyed-in data. It provides the opportunity of retrieving a certain block of data for verification and when required for correcting the tape-recorded data.

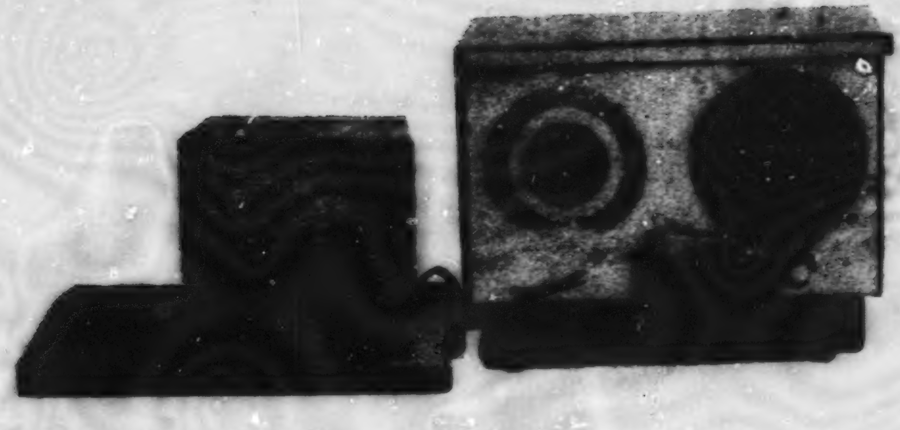
The unit has a built-in buffer storage which stores the entire block of data before being recorded on the magnetic tape. This makes it possible to immediately correct the errors noted by the operator by turning back the memory's address and putting in the correct sign.

The data are put on magnetic tape in blocks 80 or 160 digits long. The unit provides interlocking of the keyboard during the taping and the read cycle after taping, and this makes it possible for the operator to maintain a constant pace in typing in the data.

During the recording cycle, the contents of the buffer storage is not destroyed, and the data are kept for verification which is carried out by direct reading after the recording. The data read from the tape are compared bit by bit with the data kept in the memory.

In the "check" or verification mode, the blocks of data which must be checked are read and fed into the storage one after the other. Each sign of the block is reintroduced from the source document by using the keyboard. The code of the input sign is automatically compared with the code from the storage. If the two codes are the same, the operator can continue the check.

In the "retrieval" mode, the retrieval of a given data block is carried out automatically by comparing each taped block with the identifier which has been put beforehand in the storage by the keyboard. Retrieval is carried out at a speed of approximately 1000 blocks per minute.



Each ES 9004 unit can come with a block indicator for the current data block.

At the request of the client, the ES 9004 can provide the following functions:

1) The possibility of rerecording data from one unit to another;

2) The possibility of printing out the taped data on a printer;

3) The possibility of feeding in data from a punch-card reader.

Technical Specifications:

Data density	32 bits/mm
Recording method	NRZ-1
Tape speed	39.6 cm/sec.
Buffer storage capacity	160 bytes
Block length	80 and 160 bytes
Recording format	ISO system
Basic operating modes	data input, verification and retrieval
Other modes	Feed-in of program, program check, print, input from punch-card reader.
Programs	2 independent
Display	Block
Automatic functions	Doubling, fast forward or back
Power	220 V $\pm\frac{10}{15}$ %

BULGARIA

SPECIFICATIONS OF BULGARIAN DISC PACKAGES

Sofia VUNSHNA TURGOVIYA in Bulgarian No 6, 1980 back cover

[Izotimpex advertisement; "Disc Packages from Izotimpex"]

[Text]

Basic technical data	Type of package				
	ES5053	ES5261	ES5269	ES5266	ES5267
MV [expansion unknown] capacity	7.25	29/58	2.45/5	100	200
Number of discs.	6	11	1	12	12
Number of recording surfaces	10	20	2	20	20
Track density (TPI) . .	100	100/200	100/200	200	400
Bit density (BPI) . . .	1100	2200	2200	4400	4400
Disc package compatible with:	IBM1311 or equiv.	IBM2314 or equiv.	IBM5440 or equiv.	IBM3330 or equiv.	IBM3300-11 or equiv.
Specification No	DIS2864	DIS3564	DIS3562	DIS4337	DIS5653

10272
CSO: 2202

MATERIAL ON 1980 ACADEMY GENERAL ASSEMBLY

Szentagothai Introductory Speech

Budapest MAGYAR TUDOMANY in Hungarian No 7, 1980 pp 497-501

[Speech by Janos Szentagothai, president of the Hungarian Academy of Sciences at the opening session of the 140th General Assembly of the Hungarian Academy of Sciences [MTA] held in Budapest, 5 May 1980: "Increasing Demands, Greater Responsibilities"]

[Text] After the "Working General Assemblies" of the last 3 years, introduced in a rather unorthodox fashion in the beginning, but now accepted by the majority of our membership, we are now concluding a period prolonged to 4 years by returning, at this general session, to an almost 30-year-old practice of our academy whereby the work of the past 4 years is summarized in a so-called "white paper" printed ahead of time. The Presidium, general secretary, the departments, regional and secretarial committees and some other organizational units of our academy review this period with a view toward summarization and retrospection. To counter the obvious critical remarks to the effect that these reports contain very little of the conceptual or corporate evaluation of the scientific activities of the period beyond a list of some of the most important scientific results contained in the report of the general secretary, I must point out that conclusive analysis and evaluation of the activities of scientific work stations now synchronized with the Fifth Five-Year Plan, will not be possible until the end of 1980. Thus, a comprehensive review of the progress in various fields of science between 1975 and 1980 will have to wait until the 1981 General Assembly at the soonest; a more realistic target would be the 1982 General Assembly. On this occasion I would merely remark that we have had some important scientific achievements. This was also pointed out most recently at the 12th MSZMP Congress.

The central thought of the presidential report we are considering is of a more retrospective character. It analyzes the extent to which the Presidium, and the various departments and regional committees of the academy, fulfilled the demand formulated at the 11th MSZMP Congress: that the national responsibility of the academy should be better reflected in our activities at all levels, based on a recognition of the increasing importance of science in the coming decades. I would like to avoid a repetitive listing of our numerous initiatives involving both organizational aspects and working methods of the academy. These are analyzed in detail in the written reports of the Presidium and other corporate bodies which are presented in full to the critical evaluation of the General Assembly with all of their wider implications. Bits and pieces of these documents were present in the materials of our three previous general assemblies. Since the attention of our membership at these working general assemblies was focused partly on the exciting topics of scientific lectures and partly on the debate regarding organizational questions, an extensive survey of the total activity of the Presidium and other corporate bodies has not been possible until now. More importantly, we are doing this at a moment when we are facing a new, rather worrisome and even dangerous situation in the world economy and international politics. Last, but not least, we are looking at events in the light of the discussions and resolutions of the recently concluded 12th MSZMP Congress which represent a yardstick for the past and a guidepost for the future. Please permit me to apply it in my brief introduction. In retrospect, our judgment is that the spirit of the 1969 guidelines of scientific policy was in essence preserved. Furthermore, as a result of international and domestic factors already mentioned, the true intensive phase of the development of the scientific base in our country started in 1977. This will be a long process, accompanied by a great many difficulties and problems.

The resolutions of the 12th congress consider science more important than ever. What is our evaluation of our activities during the past period in the light of these succinct statements and requirements? According to the first sentence of the part of the resolution dealing with science, the party increasingly requires the participation of science in providing a foundation for decisionmaking and the fulfillment of our tasks. In this regard, although we cannot be fully satisfied with our work of the past few years, we can say that the scientific policy guidelines formulated jointly with OMFB [National Technical Development Committee] and submitted to TPB [Committee on Science Policy], together with the forecasts prepared for OT [National Planning Office], were, at least in their tendencies, up to these requirements. Perhaps I am not overly optimistic when I suppose that some important elements of the statement of the Presidium of the academy regarding the theses of the 12th congress have entered into the discussion at the congress and played a role in the formulation of the decisions adopted there. I am quite ready to grant that what we have done thus far is far from satisfactory and remains below our "best effort," therefore, we must make further efforts and even change our working methods in their entirety. As reflected in our proposed resolutions presented to the General Assembly, we must prepare to multiply our initiatives aimed at the discussion and analysis of some questions requiring scientific preparations before a political decision becomes necessary, by anticipating needs before they actually arise. Just one example is the survey of the total biological and agricultural potential of our country. This work is well under way; it is part of the program of this General Assembly. I think there is no need to dwell on the enormous importance of this question for our agricultural production and our food industry. More detailed formulation of similar initiatives and ideas, already present in embryonic form, may lead to large national programs for future years based on solid scientific foundations. This is the road toward the participation of Hungarian science workers in the long-range solution of the grave problems facing humanity by presenting bold, even radical, new ideas.

Suitable recognition of scientific performance is a reasonable demand that is especially appropriate today. We should not forget, however, the special responsibility this represents for the bodies of the academy with regard to careful, detailed work, as well as the human and ethical performance of our membership. In order to acknowledge performance in accordance with up-to-date requirements of the present day we cannot wait 10 or 20 years to see what proves durable: we must be able to measure it. Modern science possesses suitable means to accomplish this, at least in the natural sciences. Our academy has taken important steps in the area of so-called "scientometry" during the past few years by acquiring the necessary information and processing base. Of course, every scientific method has its own faults and limitations, but the negative attitude with which some of our membership greeted this initiative is hardly justified. One is led to the suspicion that some people are afraid to face such data. I would like to add also that other methods for measuring scientific output must also be used. Only the attempt to use economic, statistical and sociological means in a unified fashion can lead to a reliable way of measuring output.

The importance of requirements figured in a number of speeches to the 12th congress. Questions related to science were prominent in remarks by two women belonging to the younger generation. We always spoke out against mediocrity in scientific research. To ensure that this effort is successful it is necessary to formulate a more stringent system of requirements and insist on its application in every case and in all areas. By the way, for an outside observer, one of the impressive aspects of the congress was precisely the role played by young women. One of them was a university student who spoke of the unsatisfactory level of requirements in university education (I will return to the universities later). Another made some important statements from the standpoint of researchers regarding the need for uniform application of existing requirements.

This leads us to the next statement of the congressional resolution regarding the need for concentration of resources. This is possible mainly in areas where, among other things, the needed personnel conditions are present. But how are we to make research and development work more purposeful if we do not subject the research and development base itself to close scrutiny? This base is enormous, both in relation to the size of our country and on an international scale. In the last 25 to 30 years we developed this base extensively and at an extraordinary speed. What could be more logical today, at the time of a great deal of tension in world economic conditions, than to inquire in the present situation, which is unlikely to ease substantially in the next decades, into the type, structure and scale of a scientific research base that best fits realities, the needs of our economy, the capacity of our society and, last but not least, our personnel conditions. Yet, some unusual nervousness, even hysteria, was generated by the fact that the authorities sent out a working committee, and later some specialized subcommittees, to perform just such an inquiry. This was a first step toward formulating a comprehensive general concept. Our membership and scientific institutions received some information containing a number of important points from the most authoritative source: a presentation by Gyorgy Aczel, deputy chairman of the Council of Ministers, at the expanded general session of our academy held on 19 December 1979. As we all heard, right now all that is involved is the formulation of an ideal model of the research base in line with realities. Moving from the present situation toward this model (and not a mechanistic application of the model) will depend on further investigations and, finally, political decisions. The deadline of any measures to be taken will be set within the framework of the Sixth Five-Year Plan; even then, only the first stage will be implemented. A minimally realistic look at the present situation of our research base and the tasks we face will reveal that such an inquiry, the formulation of a new model and its gradual implementation are practically inescapable. Of course, to see the need for certain measures in the abstract, and to accept the fact that some of these measures might affect us directly, are very different things. We trust that in a few years we will be able to create the foundations for an institutional framework that is more realistically defined and better structured than the one we have at present. Of course, just as the present structure of our research network was built up over several decades, a substantial transformation will also take time. To use an analogy, a car must be driven downhill at the same speed as uphill in order to avoid undesirable side-effects.

The matter of the research base cannot be separated from the question of the universities. Unfortunately, we had to state on several occasions that the fundamental points of the 1969 science policy guidelines of the MSZMP Central Committee have not been fully implemented. To put it more precisely, a great deal has happened to university research, one of the most important of our research bases that must be preserved also for other reasons. For example, support was increased substantially, especially for natural science departments and technical universitiec. The fact that this has not yet been reflected in a corresponding rise in the quality of university research and the prestige of academic positions is presumably due to other reasons. Only a small part of this is the result of organizational factors, e.g., the lack of a suitable system of committees or deficiencies of cooperation between the systems of committees reporting to the academy or the ministries, etc. Probably a more important reason may be found in the fact that a disproportionate percentage of intellectual capacity is concentrated in oversized research institutes, while universities must live with second- or third-rate representatives of the same scientific fields. In many cases nothing more is involved than the lack of willingness to cooperate on the part of members of the two research bases, not to speak of even worse cases. In our rethinking of the research base we must pay a great deal of attention to this consideration. In general, we need to get a clear idea of the type of workplace best suited for each kind of research, i.e., an academic or enterprise research institute, a university department, or cooperation between one of the above and a potential user of the fruits of research.

The congressional resolution definitely stated that support for basic research must be concentrated in areas that help scientific progress and the accomplishment of our social goals. Here our task is to formulate unequivocal collective opinions and proposals, based on careful investigation, regarding the true relevance and quality of such research. We need not waste time and resources on irrelevant or mediocre basic research. I hope my way of putting this will not lead to misunderstandings, or be regarded as the manifestation of some kind of a technocratic attitude. Many research topics are quite abstract and far removed from practical application, but they may be very relevant to scientific progress (my own area of research is one of these, at least I would like to hope); their international quality is also measurable. Of course, even the most abstract basic research has its hidden (or sometimes not so hidden) relationship to practice: it is the researcher's task to call attention to them.

The categories of basic research, applied research and development research are rather relative. A mechanical insistence on such distinctions may cause unnecessary confusion in many fields of science; in the best of cases, it provides a temptation for exegesis and sophistic arguments. Let us apply these categories where they are appropriate and help us to see clearly and make decisions; let us not try to forcefully use them where they are unsuitable. The problem of relevance is especially important in the social sciences.

Please permit me to bring up a final example from the area of our research in philosophy. The report of the Second Department of our academy points self-critically to difficulties surrounding its own research in philosophy. My participation in the 1978 Dusseldorf International Conference on Philosophy was a great experience. The main topic of the conference was the investigation of modern natural sciences, especially the challenge posed to philosophy by cosmology, molecular biology and genetics, ecology and protection of the environment, brain research and psychology. Although a number of our philosophers are capable of holding their own in the international arena, our research in philosophy is not sufficiently prepared to investigate some central questions. In cosmology and particle physics, i.e., in the field of the infinitely large and the infinitely small, philosophy might be helpful in defining concepts and categories. In the list I just gave, the other end of the spectrum, the area of brain research and psychology, involves more than just natural science. In analogy with one of the wonders of the ancient world, the colossus supported by the two piers at the entrance of the port at Rhodos, research in this area is based both on natural science and on social phenomena; therefore, the situation is entirely different. Here we are unable to do anything without suitable preparatory and parallel work in philosophy. We accepted the implications of this fact and started cooperation among philosophers, psychologists and brain researchers. This is a good example of modern integration between natural and social sciences. This is what I mean by relevance of a field that is social science par excellence.

Speaking of our tasks, we must pay increasing attention to rethinking of the long-range priorities of scientific activity, as indicated in the report of the Presidium. In the period of the scientific and technological revolution the scope of human endeavor is so large in both space and time that any approach that is less than global must be unrealistic. Responsible planning for the future requires knowledge, decisions and data involving the entire globe. We must search for and find our own place in this global program: this is a typical academic task. Over the long run, it is the definition of the tasks that has the greatest influence on the future, by anticipating future achievements.

I wanted merely to give a brief list of some basic ideas by following the resolution of the 12th congress regarding science. I will give a detailed discussion of questions involving our work during the period we have just concluded and the tasks we face in my speech at the start of our closed session. Among these, the most important, in my estimation, is a desirable reform of the entire working method of our academy, a significant rethinking and reconstruction of our committee system. The rich and laudably interdisciplinary program of the various departments and the related debates are, of course, an integral part of our General Assembly. I ask our highly esteemed member colleagues to apply the yardstick I mentioned at the start of my introduction in their critique of the past years and to use the same as a guideline for their thoughts regarding the future.

Secretary General's Evaluation

Budapest MAGYAR TUDOMANY in Hungarian No 7, 1980 pp 502-508

[Speech by Ferenc Marta, secretary general of the Hungarian Academy of Sciences, at the opening session of the 140th General Assembly of the academy in Budapest, 5 May 1980: "Balance Sheet of the Past Period"]

[Text] The written report of the general secretary of the academy presented to the General Assembly on this occasion does not deal with the activity of a single year; instead, it provides a survey of the work of the academy in the sphere of the general secretary over the past 5 years and a summary of the period for which the general secretary and his deputies were named on the basis of the recommendation of the General Assembly and one that is concluded with this meeting where new officers are to be selected.

I

1

The 1980 General Assembly of the academy has the primary function of evaluating the work of the past 4 or 5 years. But in view of the fact that this year's General Assembly falls on the start of the first year of the 1980's, it presents a good occasion for looking back on the 1970's and evaluating the work of the reporting period within the framework of the process of development begun in the 1970's. This is clearly justified not just because of the start of a new decade but, more importantly, because the publication in 1969 of the science policy guidelines of the MSZMP Central Committee began a new stage of development in the scientific activities of our country; this had the most direct impact on us, the academy, Hungarian science and scientific activities in our country. The science policy guidelines set forth in this resolution were reaffirmed by the 10th and 11th party congresses and their main goals were also reiterated by the 28 June 1977 statement of the Political Committee. The 12th congress, concluded a few weeks ago, had the task of formulating the entire social and economic program of the first half of the 1980's. It placed special stress on the need to fully implement these science policy guidelines.

Thus, we can say that the decade of the 1970's started with the formulation of the science policy guidelines mentioned above and continued with the organizational work aimed at their implementation as well as scientific research activity. There is no doubt that the decade of the 1980's will be a period when the aims formulated in the 1970's, and made more precise as a result of the experience of implementation, will be realized.

2

The guidelines dealing with scientific policy, formulated in party resolutions, are based on an attempt to consistently implement the principle stating that the increasingly important role of science is a natural aspect of the progress of our socialist society. Scientific research is increasingly becoming an organic part of a great many spheres of our society (economic, political, cultural, ideological, etc.). For example, it is well-known that our economic development is largely dependent on our ability to increase the production of goods that are competitive in international markets. This is not possible without up-to-date technical development and the research it must be based on. When, on the other hand, we consider the host of new questions and phenomena arising as a result of the development of our socialist society, the increasingly complicated international ideological struggle and, in general, past and present changes in the world and in our country, and the task of analysis and scientific inquiry this presents to the social sciences, the increasing role of science becomes evident. Thus it is clear why the 10th, 11th and 12th party congresses placed increasing stress on the need for more intensive involvement of science in laying the foundations for social and political decisions, formulating our socioeconomic goals and implementing them. The resolution of the 12th congress also stresses that recognition and support for scientific research must be based on the success and value of scientific accomplishment.

The most important requirement and task arising from these resolutions is to increase the effectiveness and efficiency of scientific research activity. This can be accomplished only if we implement a principle that has always been talked about but little used in practice: that support must be given primarily to those research facilities and researchers whose work is at the forefront of international science. The overwhelming experience shows that scientific achievements that are at the forefront of international science can be used most efficiently in practice. Thus, substantially greater support and recognition must be given to those who demonstrated their effectiveness by producing scientific results that are at the forefront of international science and are applicable to the solution of our social and economic tasks. It is also imperative that a much greater number of our researchers become sensitive to social and economic needs and take them into consideration when selecting their research topics.

The capacity of our scientific research base to contribute to the accomplishment of our social goals is significantly influenced by existing obstacles to the process of innovation. Therefore, even if we raised the effectiveness of research to much higher levels and all research results were of international quality besides being applicable in practice, this would not guarantee that these accomplishments would be utilized in practice unless we make sure that the necessary conditions are present. This is quite self-evident and would not even be worth mentioning except for the oft-expressed view that blames the researchers themselves for the unsatisfactory situation with regard to the practical application of the fruits of research. This judgment is often justified in the case of a substantial number of those counted as researchers by statistics. But many researchers have not only the best of intentions (this, in itself, would not be enough); they also possess outstanding scientific results well suited for practical applications. Most of these, however, will not be utilized even though the researchers often do everything in their power to put their results to use.

To summarize the 1970's with these factors in mind, many institutions, workshops and direct management organizations concerned with research and development activity spared no effort in their struggle with their tasks. They won a few rounds and made progress along the road indicated; they overcame a number of obstacles. At the same time we must honestly admit that they have not achieved victory and could not achieve a decisive breakthrough. This was pointed out in the 28 June 1977 resolution of the NSZMP Political Committee entitled "Experience and Current Tasks in the

Implementation of Science Policy Guidelines." This stated, among other things, that the efficiency of domestic research and development activity is unsatisfactory, especially in view of the increasing new demands placed on research and development as a result of the stricter requirements accompanying the social and economic development of recent years.

3

It would not be fair to be overly strict in our judgment regarding the above-mentioned efforts that turned out to be only partially successful. Their effectiveness was undoubtedly reduced by a number of weaknesses in work organization, unfavorable external conditions and also some personnel deficiencies. Careful, sober analysis is needed to pin down the reasons and to define the tasks and conditions necessary to carry them out, including the time factor. It is obvious that a research and development organization and activity that was 30 years in the making cannot be transformed overnight.

4

Therefore, we must not only ask how far we have progressed toward the goals we set: we must also inquire whether the progress we made and our undoubtedly more modest achievements make it possible for us to reach our goals.

With this in mind, I would like to add a few remarks to the written report.

II

In the situation we faced, our most important aim, in view of the goals we set, was to ensure that the Hungarian Academy of Sciences and its network of institutions find their place under constantly changing conditions and turn research and the development of science in our country toward the desired direction in accordance with the paramount role of the academy. This aim was reflected primarily in the formulation of the specific profile of academic research facilities, the corresponding modernization of the network of institutions, increasing alertness to social and economic needs, improvement of the conditions of research and better utilization of the opportunities offered by international cooperation. It is no exaggeration to say that the factors mentioned contributed to raising the scientific quality of research work. There have been some highly important research accomplsihments. A number of these was applied in practice with enormous benefit to the society and the economy.

In the area of our activities on a national scale, our aim was to ensure that the cabinet-level decisions, decrees and measures concerning the nationwide direction and coordination of research take into account the specific role, potential, organization and operating procedures of our academy and its network of institutions in the area of scientific endeavor.

I would like to give a brief account of these aims and accomplishments.

1

When we ask once again, as we did so many times during the past 5 years, what specifically should be the function of the research network of the academy, then we are in a position to define two fundamental requirements. On the one hand, academic research institutes must carry out high-quality, successful research in areas where the fruits of research are used directly to satisfy social or economic demand. In addition, emphasis must be placed on branches of science where the fruits of research provide the foundations for future progress because in the long run they encourage or accelerate the completion of socioeconomic or cultural goals.

This definition of research goals sets strict limits in several areas. It means that the always tempting, but never feasible, goal of universality must be given up. Academic researchers cannot concern themselves with everything that appears on the horizon of their science. Research must be concentrated in the areas that have the highest present or long-range importance from the standpoint of our socioeconomic and cultural development. Additional types of research are justified when they concentrate on the central questions of a given branch of science and thereby accelerate its development. From the standpoint of the rational management of our intellectual and financial resources it would be unreasonable to fritter away the strength and effectiveness of the concentrated intellectual capacity found in our institutes to deal with research topics that are unworthy of such efforts.

Starting in 1976, the activities of the network of academic institutes crystallized in this clearer and narrower direction. This is proved by the large role our research workers played in carrying out research tasks directly related to socioeconomic goals within the framework of national or ministry-level research projects. They also increased the percentage of projects arising from outside contracts. The remaining, still substantial, portion of their resources were devoted to mostly freely initiated research aimed at the foundations of future progress. There is no precise data on the percentage of the latter category, but it must represent at least one third of the total capacity of academic research institutes. A good example of research aimed directly at the accomplishment of socioeconomic goals is the participation of academic institutions in the national and ministry-level research programs and special medium-range research projects listed in the written report. Among the research topics aimed at the foundations of future progress, based on the initiative of institutes, one must mention solid state physics, nuclear physics, structural research in chemistry, mathematics, molecular genetics, genetic surgery and special topics in economics and sociology.

2

Organizational changes within the network of institutes were influenced by the assignment of research tasks, their relationship to high priority tasks and the definition of the ratio of research topics initiated by the institutes themselves. There have been substantial changes in the functional areas of some institutes. For example, the thematic framework of research carried out by the Central Chemistry Research Institute was transformed substantially by the project called "Research into Biologically Active Chemicals." New research activity was focused on the discovery of new pharmaceuticals and pesticides. A similarly radical change occurred in the area of nuclear energy research carried out at the Central Physics Research Institute as a result of the tasks realted to the construction of a nuclear power plant in our country. The increasing importance of research into economic policy required the concentration of the best researchers within the Institute of Economics. This, however, did not require major organizational changes relative to the institutes themselves.

The organizational changes in the area of research positions in university departments supported by the academy were much more significant. Among these changes the most important ones were the transfer of some of the support to the ministries supervising the universities. As a result, the number of research positions within university departments supported by the academy declined from 81 to 67. Another important milestone of organizational change was the formation of the MTA-SOTE [Hungarian Academy of Sciences--Semmelweis University of Medical Sciences] Joint Research Organization with the participation of eight departments within the Medical University. We obtained some favorable experience in recent years with an expanded system of so-called project grants whereby university departments or other research institutions receive support for a precise purpose and for a limited period, based on competition.

3

The personnel and financial conditions of research establishments have improved. The number of workers has increased. Support from the state budget has increased by about 17 percent in 4 years. Although financial conditions have improved slower than planned and the rate of improvements has slowed, especially in the area of investments, due to reasons that are well-known, we can still state that the overwhelming majority of institutes did not have to live with a shortage of financial resources that could have a major impact on the fulfillment of research tasks.

4

We wanted to improve the efficiency of research through more rational utilization of the potential represented by international cooperation. Our goal was to deepen, rather than widen, these relations, especially by improving bilateral and multilateral cooperation with the academies of socialist countries and better selection of joint research topics. The number of cooperative projects carried out jointly with the scientific institutions of capitalist countries also increased.

5

In the past 4 to 5 years we made an effort to simplify the planning and reporting system of academic institutions in order to enable us to form more objective critical judgments regarding the scientific value and social benefits of research results. This work required additional assistance from corporate organs. Cooperation improved in this area, but the evaluation of research accomplishments still represents a difficult problem for us. To achieve progress, it will be necessary, among other things, to devote more energy to the application and development of international experience and methods dealing with the evaluation of scientific work in accordance with conditions in our country.

6.

The written report provides an overview of the more important research results obtained by academic research institutes and research establishments receiving support from the academy as well as the practical applications of these results. The work related to the evaluation of results is still in progress. Information regarding this evaluation will be available at the next General Assembly of the academy. Without prejudging this evaluation it may be said that a substantial portion of the results obtained by the academic research base is of international quality, while a smaller portion is at the forefront of international research. As we pointed out in the written report, the percentage of mediocre achievements is rather substantial and there are also occasional cases of low quality research.

The picture is quite positive when we compare the academic research base in its entirety with the national average. In terms of the size of its workforce, the academic research network comprises 10 percent of the national total; when we count only research institutes, the proportion is 20 percent. Academic institutes employ 82 percent of academicians, 66 percent of the doctors of science and 50 percent of candidates, if we include only fulltime research scientists. Twenty-five percent of all support given to research institutes goes to institutes of the academy. Comparisons based on publications, patents or innovations clearly show that the total output of academic institutes is far above their share in terms of personnel or financial support. The scientific accomplishments of the academic institutes are indicated by the fact that during the past 5 years 40 research scientists received state prizes. The undoubtedly positive impression arising from such comparisons cannot hide the fact that serious deficiencies do exist with regard to the quality of research performed at a number of institutes. More resolute steps are necessary in order to eliminate these deficiencies. Some ideas have been formulated on this subject in the course of ongoing work aimed at the reexamination of the network of research institutes. These ideas envisage improvements from the standpoint of concepts and research topics and, less importantly, a small number of organizational changes.

7

Activities carried out on the national scale were centered on improving the effectiveness of research. We tried to achieve this by modifying the organizational structure of national direction, modernizing the management information system in the technical research and development area and, most importantly, by participating in the preparation of resolutions regarding the planning of research. Some important stages of this work have been completed successfully. For example, the guidelines entitled "Main Directions of Scientific Research" have been completed, together with the outlines of the national medium-range research and development plan.

Aside from activities directly concerned with research and development functions, a number of questions subject to regulation on the national scale required our opinions and remarks, as well as the formulation and publication of proposals in our role as the head of an organization with jurisdiction on a national scale. This was carried out on an ongoing basis in the spirit of cooperation by building on the good working relationship we developed with state government organizations.

III

Looking back on the road we have traveled, on our goals and the sometimes successful and sometimes perhaps wasted efforts to accomplish our goals, we can state that some progress has been made. There is no doubt, however, that it has been less than needed and, unfortunately, also less than we could have made.

The tasks formulated in the resolution of the 12th party congress clearly show that our socioeconomic progress requires more efficient contribution from science.

The tasks found in the resolution define our most important immediate tasks.

The academy and its institutions must continue to play a decisive role in scientific endeavors within our country by organizing and directing research work. To this end, among the research activities of academic institutes priority and increased support must be given:

a) to research that is in step with the forefront of international science and is suitable for bringing us closer to our immediate socioeconomic goals, as well as basic research aimed at the discovery of new facts and laws, but not directly related to socioeconomic goals in cases where the results obtained are outstanding by international comparison, and serve the progress of science by providing the foundations for the future.

b) Academic research institutes must play a more prominent role in the work, organization and direction of the programs of OKKFT [National Medium-term Research and Development Plan].

c) The fundamental principle of the modernization of the thematic and organizational aspects of the research base should be its suitability for fulfilling its mission and carrying out the tasks mentioned above.

d) It is necessary to formulate and strengthen the mechanisms, procedures and relationships that provide opportunities and encouragement for practical applications of research results.

e) The planning of research, investment, income and cadre policies and the policy regarding the cultivation of international scientific contacts must reflect the requirements formulated in the congressional resolution and quoted previously.

f) In the interest of a realistic, differentiated evaluation of scientific accomplishments it is necessary to encourage the application and development of international methods in line with our specific conditions. The help of corporate organizations must play a more prominent role. Cooperation and internal coordination must be improved, and the specialists and representatives of organizations interested in the utilization of research results must take part in the evaluation process.

IV

In the 1840's, during a period of great enthusiasm of the reform movement following the establishment of our academy, Vorosmarty wrote as follows: "Patriots in all walks of life look on the academy with great expectation. Some expect, first of all, a definitive book on grammar; others, a perfect dictionary; still others, textbooks for the schools, while some expect the academy to bring everything that is good and does not yet exist... There is soemthing in this kind of talk that may be termed faith, expectation or even public trust that must not be wholly deceived. Although it seems that everyone expects and desires something different from the academy, they all agree, in that they all expect something."

Many things have happened since these lines were written. Our academy has seen good times and bad, and gone through a number of storms. Its activities have resulted in immense accomplishments and occasional failures. Fundamental changes have occurred in our country since Vorosmarty wrote the lines we quoted. It is still true, however, that our society expects a great deal from the academy, that it has faith in the academy, in

Hungarian scientists and researchers. Today, however, we can no longer complain about not knowing what is expected of us, or what is to be done in this important period of the development of our socialist homeland.

I am convinced of the ability and readiness of the members of our academy and the researchers and workers of our institutes to tackle the problems we face. Their performance and accomplishments thus far provide a guarantee of a breakthrough in improving the effectiveness of research during the Sixth Five-Year Plan period.

I call on the General Assembly to debate and kindly accept my written report together with my verbal amplifications.

Aczel Addresses Meeting

Budapest MAGYAR TUDOMANY in Hungarian No 7, 1980, pp 509-517

[Text of speech by Gyorgy Aczel, member of the MSZMP Political Committee, to the opening session of the 1980 General Assembly of the Hungarian Academy of Sciences on 5 May 1980 in Budapest; edited on the basis of stenographic notes]

[Text] I am honored to bring you the greetings and best wishes of the Central Committee and the Council of Ministers. My greetings to all participants of the General Assembly, members of the academy and invited guests who not only ask for and expect, but also--recognizing our situation--demand greater and speedier help from science.

I am convinced that the 140th General Assembly will enter history as one of the more important gatherings, provided that it carries out its tasks by realistically surveying the tasks facing our nation.

The 12th party congress and the months of social debate on the guidelines of the Central Committee provide a realistic basis for, and demand, long-range thinking. Discussions at the academy were valuable and useful in the exchange of ideas preceding the congress. The proposals and criticisms of the Presidium of the MTA represented a valuable contribution to the preparatory work of the congress, as was the identification with fundamental principles of policy reflected in their proposals. I would merely like to contribute a few thoughts to the reports on the president and the general secretary, the current issues they highlighted and the hopefully open and lively debate to follow.

The 12th congress was a working congress that held discussions in a sober atmosphere of trust in a period when the internal and external conditions of our work became more difficult. We decided to continue along the road to advanced socialism toward the goals set forth in the Program Platform of the party looking ahead for the next 15 to 20 years based on a careful analysis of the current reality and our situation.

The congress placed a great deal of emphasis on quality-related requirements. It analyzed the possibilities of preserving, developing and enriching the values of socialism while the growth rate of the economy declines. In this manner the congress laid the foundations for a new, qualitatively different stage in the development of our society.

Our main political strength in accomplishing our taks is the national unity that has emerged relative to the main questions and goals of socialist development and the need to preserve peace. This is not the unity of uniform greyness but a many-colored unity in the fields of politics, society, economy, culture and science. A large part of our society is characterized by the identity of goals and a multitude of approaches coupled with a search for new methods. We are counting on new energies liberated by further development of socialist democracy. This will enable us to react, in a soutable and timely manner, to the changes occurring in the world and in our country.

New Ways, New Means

The problems to the discussed by the General Assembly of the academy and the departmental sessions reflect the great questions of the new decade. As a layman, let me mention an important enterprise such as the nationwide survey of agroecological potential. The joint session of the social science departments devoted to the decade of the 1970's in Hungarian history is another initiative with wide implications. These initiatives are good and topical. Allow me to discuss the decade of the 1980's with a view toward the General Assembly program of the scientific departments.

The milestones of development are not tied to the calendar. We may be certain that the so-called 1980's, which started during the preceding decade, will not last until 1990, provided that our work is successful. Our most urgent task is to hasten the onset of more dynamic development of our economy and society in new ways and by new means in line with changing conditions.

In discussing the present situation, we must ask the question: what does it mean today to say that our country is among the nations with a medium level of economic development?

I think this means more than a few economic indicators such as per capita national income. It also depends on the quality of human relationships, the state of the nation's health, public morals, work sophistication and a number of factors characterizing the level of political development. The expression "medium level of economic development" conceals, in the eyes of some people, the fact that in terms of human relationships and requirements we are not simply better, but rather different, from the most advanced capitalist countries. In spite of this we cannot be satisfied because the tasks we face today require more progress also in the area of human factors.

Today in our country historically progressive and revolutionary aspects coexist with the obsolete, antiquated and conservative. Progress is accompanied by unexpected contradictions in all areas of society. To mention just a few of the many examples: we now have a number of modern large scale industrial and agricultural enterprises, but in some of them production costs are too high. Elsewhere one finds that sophisticated production methods are gaining ground more rapidly than civilized life in general. It is nice to have meat processing plants where hygiene is up to international standards; the problem is that the accepted everyday average level is much lower. Today we see cases in some of our industrial plants where the sophistication of the leadership is way below the professional expertise and abilities of skilled workers. Not infrequently, brand new scientific accomplishments or imported up-to-date machinery are not being utilized because of the lack of skills in the workforce and deficiencies in work organization in less advanced plants. Of course, the example of productive teams working under the most up-to-date conditions may set new standards for the entire society, provided that the democratic openness of society accepts their accomplishments.

The level we have reached represents an enormous achievement relative to our past. Our future requires something more, something different, because in economic competition international standards are the yardstick by which success is measured. We cannot withdraw from this competition. We must stand on our own and, at the same time, work toward our socialist goals.

To satisfy these requirements we must win the people's trust again and again. We must work toward unified action in each question that arises. Under dynamically changing conditions this requires initiative and constant renewal of our goals and methods.

External and Internal Conditions

What are the external and internal conditions we must take into account?

The conditions of extensive development are no longer present in our economy. The old resources are largely exhausted. (Fortunately, one must add, for at least some of them). We must search intensively and without delay for the road toward intensive development.

Our experience shows that the long-term unfavorable turn in international conditions involving a number of basic processes of the world economy is a reality of the present time. In spite of all the difficulties, we can work toward a more rational and rapid organization of our work by starting from existing objective conditions instead of self-justification or waiting for miracles to happen. Only a bad agronomist would blame the weather every year instead of trying to breed frost-resistant varieties. Similarly, the correct thing to do in our situation is to flexibly adapt to changing circumstances and thereby serve our own aims.

The cause of detente and security came to the forefront at the beginning of the 1970's. The living standards and consumption patterns of millions of people underwent substantial improvement. Our life has changed. Science, culture and education have all been enriched. All of this was reflected in a more unified social atmosphere that was taking shape as a result of healthy debates. At the same time we saw a slowdown of economic development and growth, a decline in social mobility and controversial trends in our value system.

What kinds of answers and behavior patterns have emerged? How did the various social strata react to these processes in terms of their state of mind and general awareness?

At the start of the new decade one finds there are those who accept innovation and initiative, transform new opportunities into action, and, for this precise reason, often encounter resistance. On the other hand, there are those who are frightened of the opportunity to act and show responsibility. Some are undoubtedly confused by a changing system of values. Others show inhibitions and uncertainty when it comes time to act. Some are giving way to despair or worse. Bureaucratic cowardice, fear of responsibility to make decisions, and hiding behind legalisms are becoming more noticeable and more difficult to tolerate. We can also see some attempts to simplify reality and show impatience.

More complex aspects of progress, new opportunities and alternatives may lead to initiative and reform-mindedness. They may also provoke a flight into mistaken ideologies. These include nationalism, neoconservativism, pseudoradical criticism that does not consider realities; more frequently, indifference and relativization of all values. Precise and realistic awareness of historical processes is even more indispensable in transitional periods such as the present. This requires a weighing of history, not a false reevaluation of it.

Our thinking is dominated by a recognition that the development of our society depends, most of all, on improving the human condition. This is closely related to the increasingly universal interdependence among specific problems and institutions of our economy, culture and politics.

One of the chief difficulties of the changing situation is the need to recognize and utilize the fact that, for example, economic development involves more than the price system, the regulators and energy management; it is also a question of work ethic and sophistication, political confidence and scientific quality. Lifestyles, on the one hand, involve more than education, consciousness and morals; they also depend on industrial policy, urban development and the state of socialist democracy. Political sophistication, on the other hand, is influenced by party and social organizations, the school system, the economic mechanism, our policy on art and the price system.

This brings us to the renewal of social, economic and political organization and relationships. There are those who tend to see these new requirements only as limiting factors. But they are more than just that. They must hasten and strengthen creative activity, the striving for better and more beautiful things and increased involvement in all areas of life.

Accepting the Challenge

The basic choice we face in the 1980's can be summarized as follows: either we withdraw, preserve what we have and reject the challenge, which implies falling behind (not to mention those who want to step backwards and hold on to obsolete nostalgies); or, we accept the challenge with its enriched requirements and make ourselves ready to mobilize our internal resources.

Today the need to choose between alternatives is present in all areas of life, in every decision. The possibility of a step backwards is always there. So is the opportunity for better and more rapid development.

Even though we are forced to reduce our growth rate, we are still for expanding standards, reforms, creative dissatisfaction and the formulation and acceptance of programs necessary for further progress. This is the natural consequence of three and a half decades of our social, economic and cultural development. This was reaffirmed also by the congress.

Processes aimed at renewal of various areas of society, economy and culture are being started to achieve these goals.

The new producer price system came into being. Economic regulators underwent substantial change. We are discussing the development of flexible relations among enterprises, the improvement of their operating conditions, the creation of small and medium-size enterprises and questions relating to the utilization of the so-called "second" or "auxiliary" economy.

A social policy must be formulated in line with the new situation.

We must work on the unified development of education, training, retraining and continuing education.

We must make substantial progress in the practical application of scientific accomplishments, especially through the development of the relationship between science and production, social science and politics.

Development of the institutional structure and refinement of direction is also on the agenda.

These initiatives, listed for the sake of illustration, are innovative, reform-minded ventures that are becoming part of a national program in the debates on the guidelines and in the spirit of congressional resolutions. We know that even the most perfect system of laws and regulations cannot replace responsible, creative people. Only by working together can we formulate our plans; only with the creative participation of the whole nation can we fulfill them.

From the Standpoint of Science

What are the implications of these tasks for science?

They mean more and, in some sense, something different from the past. The hunger of society and the economy for science is increasing, although this is unfortunately not realized everywhere; this hunger must be satisfied.

It is impossible not to notice that science has become more open toward the problems of society, economic reality and the new problems facing man. Perhaps there are many who expect no more from politics than to reassure the men of science that our economic difficulties will have no impact on the support for research. The question, however, must not be oversimplified in this manner.

Science today is a question of vital importance in a more profound and manifold sense than at the time of Szechenyi, Vorosmarty and Arany. There is no need to repeat that without science we are unable to fulfill the tasks of our present and future. We will not let our intellectual treasure lay idle. Neither shall we fritter it away, not only because of our respect for science, but also in the interest of our nation. The intellectual capacity of our country is present in every Hungarian product that can hold its own in the world market and meets the standards of the domestic population. Although this seems to apply most of all to engineering and agricultural science, this does not mean that we have no need to form a direct alliance with social sciences when we want to make rapid and good political decisions on the basis of a scientific analysis of reality.

The optimism mentioned in the closing speech by Comrade Kadar to the congress does not mean a belief in automatic progress. What it means is that science should develop dynamically, even in a period when economic progress is slowing down. Whether this is what is going to happen will depend on the extent to which our intelligentsia will provide the momentum for the dynamics, whether it is able to find new bases in production and education and whether it is able to build on them.

This insight is not new. Let me just mention the great work of the academy in the area of developing state education. The lessons of this work were used and will be used in the course of the practical development of public education. The academy played a major role in initiating the organized protection of the environment in our country by calling the attention of our government organs to this question so they could take the necessary steps. Members of the academy made strenuous efforts toward the protection of Lake Balaton.

Diversified ties have developed in past years between science and the economy, education, and political and cultural processes. This is unavoidable because advanced socialism cannot exist without advanced science. Socialist national progress cannot exist without a corresponding rise in the quality of science. Socialism is the first historic enterprise of humanity that is governed by a scientific theory. It searches for the best opportunities to ensure that scientific knowledge becomes part of, and has a positive influence on, reality.

Directions of the Development of Research Institutes

Much has happened in the past few years to encourage the practical applications of science. The slogan calling on science to turn toward practice is no longer enough. Those on the side of practice should also ask for and accept the achievements of science. Understanding dialogue and cooperation in all areas between science and practice is today indispensable. A vital requirement is to create a more appropriate, flexible and more regular relationship between their areas and to avoid all kinds of schematism and false simplifications.

The introduction of scientific results is not just a question of organization. We cannot expect success without winning over the intelligentsia, the engineers of an enterprise, the foremen, workers, agronomists, council chairmen, party secretaries.

True cooperation between science and politics, based on joint responsibility, is especially important. This requires the formulation of an increasing number of the conclusions of social science in a way that makes them suitable for practical use, as well as readiness to use these conclusions in all levels of political work. Along with the role of social sciences in exploring reality, achieving a synthesis and forming human consciousness, we cannot dispense with coordinated, creative cooperation among all other branches of science.

Organized, purposeful cooperation and joint interests among the technical and social sciences and, in general, between practical technical or agricultural specialists and scientists are indispensable preconditions for the economic utilization of new scientific results or discoveries. The process we call innovation or renewal will play an ever increasing role in technological development in almost all areas of society. New scientific results must be thought through and carried through from their birth all the way to marketing the endproduct.

The entire system of scientific research institutions must be surveyed. This must include the problems of the research base, planning, financing, optimal use of intellectual resources, training, retraining and continuing education.

At the beginning of socialist construction, when scientific research indispensable for technological development had to be based on an uneven, backward industry and an even more backward agriculture we had inherited, we established a largely separate, centrally managed system of scientific institutions in order to protect science. Today, in view of the much higher level of development of our economy and changes in the methods of direction, the question arises whether this kind of separation between science and production represents an obstacle to the progress of both areas. Researchers and practical specialists have to bridge this gap through cumbersome institutional contacts that are quite artificial. High-quality scientific work and development are needed to provide the foundations for various areas of production. We need more research establishments that are an organic part of industrial or agricultural enterprises.

Emphasis must be placed on increasing the willingness and ability to receive and use scientific results. This could be accomplished by transforming institutes, when possible, into mobile organizations whose primary task is to introduce new results, to take charge and to implement processes formulated in various places.

The other direction for the development of research institutes points toward the universities. Our greatest national treasure, knowledge, is being wasted when a substantial portion of our qualified scientists are not being used in university teaching, and when universities are unable to make use of the most modern research facilities. This is one of our old problems and we must not accept it as unsolvable.

One of the fundamental truths of science policy is that there is no progress, especially scientific progress, without a unified, well thought-through, dynamic development and management of educational affairs that is of high quality and free of improvization. This is the most urgent task facing us in this new decade.

There are those who, from the standpoint of narrow economic considerations, would advocate that we ignore those areas that lead to practical applications only indirectly, over the long haul, those we call basic research. We will not do this. We will not let accumulated knowledge go to waste; we will not forfeit our true cultural treasures.

It is now frequently impossible to draw a rigid line between so-called basic and applied research. Everyone in this hall can give us numerous examples when apparently abstract scientific results, far from everyday practice, unexpectedly lead to substantial practical benefits, or when the application of scientific results provides a key to long unsolved theoretical problems. Thus, one can hardly overemphasize the responsibility of the academy for the nationwide support of basic research.

Atmosphere and Conduct

The state of our scientific community and the performance of science depend largely on the quality of competition, publicity and criticism in science. In a word, they depend on the extent of democracy in this area. This can be best accomplished if scientific workshops and researchers face major tasks; if scientific organizations help in reducing the influence of nonscientific considerations; if criticism that seeks scientific truth is given a hearing before the public of scientific organizations. This kind of debate must be supported and encouraged.

Consideration of scientific performance cannot depend on the age, scientific rank and job of the person in question. We need to develop a social and scientific atmosphere in which the moral and financial recognition of researchers is proportional to their real performance. I know that evaluation is one of the most difficult problems in science, but perhaps the development of socialist democracy may be helpful in this area.

I think that the greatest scientists were more than just the discoverers of new casual relationships: they were also the discoverers and teachers of new talent. The first requires a great deal of intellectual strength, while the second also involves moral strength and commitment to the progress and future of science. Every the great scientist has a school, be it large or small; here, students who are more than just sycophants prepare for their future accomplishments.

Even the best ideas can be distorted when they become an obsession. Even the greatest thoughts may lose their creative force if their authors surround them with tall fences and regard them as private property that cannot be touched by other ideas. This is what defines the socialist character of a scientist's conduct: whether we can change this private property relationship that sometimes develops into a monopoly that binds researchers, research teams or even entire institutes to their own ideas and blocks their individual progress.

Consistent implementation of the science policy guidelines means the accomplishment of these tasks.

Internal Momentum

The occasion and the place understandably prompted me to dwell on the social role of science. When we discuss the social role of science our thinking is governed by the question: what is needed to mobilize the internal resources necessary for our economic and social progress?

First of all, a precise awareness of the situation, realistic knowledge about ourselves, insistence on a theoretical basis for every area of social action, and a willingness to supply theoretical knowledge. The congress resolution warns against the dangers of both ideological distortions and the belittling of theory. We must be consistent in our application of the performance principle and we must not give up considerations of humanism. Differentiation among individual or organizational performances is indispensable. Higher quality must be given preference precisely in order to eliminate inequalities.

We must investigate the value system of our changing society and the consumption model that serves our development. Today we do not really know which of the really existing human needs are the ones that must be supported to encourage the demand for the emergence of personality, a meaningful life and rich humanity. Of course in this area there is no place for any kind of regimentation. I do not believe, for example, that large numbers of people could be made to give up certain card games by command. But perhaps we can do soemthing to increase the popularity the intellectually more demanding game of chess.

One can expect a kind of change in lifestyles and living conditions and an increase in job mobility that will engender conflicts that are no less significant than those of major social transformations.

This means that there is a pressing need for experiments that are helped by society. We must permit experiments involving initiatives or ventures that improve and enrich our situation and overcome obstacles in all areas. This must be done in a responsible manner, not just for its own sake.

We must implement the conclusion, reiterated by the congress, that a more difficult economic situation requires more, not less, democracy in public life and in all areas of society. The development of socialist democracy is not just the task of the party and government leadership: it involves all public authorities, people and organizations. The development of the economy is not just a question of economics. Science could set an example if scientific councils within our institutions would gather strength and their real influence on institutional questions would grow. This could also lead to a substantial strengthening of professional management.

What are the implications of all of this? They involve new opportunities for action and some contradictions that were unknown until now. As of now, we cannot expect less conflict but more, along with changes in the requirements that apply to individuals and institutions, a reevaluation of the concept of security and changes in demand.

The question of social justice is emerging on the basis of our old principles, but in a new way and with a great impact. The concrete meaning, historical opportunities and contradictions of social justice are subject to change.

When we emphasize the principle of equality we may not be fully aware that this also means an acceptance of inequality in the struggle for more equal chances and conditions.

There are traditions of formal equality and egalitarianism in our thinking, although Marx already called attention to the fact that equality without material and intellectual wealth merely means generalized poverty.

We are on the side of talent, the acceptance of responsibility, accomplishment through struggle, courage of thought and action, special recognition, and above-average conditions for better qualified individuals and differentiation in the interests of the community. This often implies a struggle for our own renewal, for changing and preserving our values and the shedding of obsolete ideas and illusions. At the same time, these conflicts and the sometimes painful changes of the period we face will create the pleasures of accomplishment for those who consciously take on these tasks. This involves more than a small number of intimates: it encompasses wide masses. Man progresses through this struggle.

Today perhaps I spoke longer than usual about changes, innovation, reforms and programs aimed at the solution of our common problems. Our common task is to actively react to these truly vital national issues that are solvable and are awaiting solution. The continuity of our policy and the foundations of our methods provide assurance because this is the only way to preserve our socialist national unity based on well-tested principles formulated by the party. Only with this strength can we make progress with the entire nation. Attila Jozsef feared for humanity on account of the "ancient monster" of "unthinking thought;" we, on the other hand, expect more dynamic, rapid and beautiful progress of socialism from ideas that are well thought through and that are being implemented in practice.

Only a few days separate us from the 35th anniversary of the end of World War II. Europe has had peace for 35 years. The history of this continent has never had such a long peaceful period. Unfavorable changes in world politics again raise serious questions. We cannot see the future, but we are people of action. We are certain that the forces that have made it possible for our continent to enjoy peace, the elimination of cold war and detente continue to exist.

Waiting for miracles and resignation in the face of lurking dangers are both serious mistakes. What we need instead is rapid, constructive reaction and cooperation with all forces that are willing to cooperate in all areas of life.

The recent European Science Forum held in Hamburg is a good example. This conference also showed that not only does detente help in the universal development of science and the internationalism that is part of its very nature, but that science with its goals, humanism and authority can also accomplish a great deal for the cause of peace and detente. It is pleasing to find that Academy Week and the Day of Peace are traditionally celebrated at the same time. For our policy aimed at the preservation of peace, the precondition for all of our human goals, and for our efforts formulated by the congress, we ask for the active and critical cooperation and firmness of the Hungarian Academy of Sciences and science in general. We ask for the help of science in developing the socialist quality of our life.

Minutes of General Assembly

Budapest MAGYAR TUDOMANY in Hungarian No 7, 1980, pp 544-547

[Text] The 140th General Assembly of the academy opened on 5 May in the meeting hall of the Hungarian Academy of Sciences in the presence of the leadership and members of that body and well-known personalities of our scientific community. Gyorgy Aczel, member of the MSZMP Political Committee and deputy chairman of the Council of Ministers, was a participant and speaker at the session.

The General Assembly was charged with the task of debating the activities of the academy between 1976-1980 and delecting new officers. The session was opened by Janos Szentagothai, president of the academy. In his introductory speech he gave verbal amplifications complementing the written report of the Presidium. Afterwards, Ferenc Marta, general secretary, presented his written report. Then the General Assembly of the academy heard Gyorgy Aczel deliver the greetings of the party and the government. (All three speeches are published in this issue.) The opening session ended with the award ceremonies of the academy prizes and Arany Medals of the academy.

Scientific departments held their sessions from 5 to 8 May. The work of the General Assembly continued with a closed session held in the afternoon of 8 May in the Congressional Hall of the Royal Palace.

Debates of the Closed Session

Debate on the reports started with a speech by President Janos Szentagothai under the chairmanship of Vice President Jozsef Fulop. The speech called attention to some of the fundamental questions of the management and organization of science. The speaker gave a critical analysis of the activities and working methods of the academy and pointed to especially important problems mentioned in the working papers of the General Assembly. Then general secretary Ferenc Marta surveyed the formation of the network of research institutes and the status of the situation report that is nearing completion. On the subject of ideas concerning the development of academic institutes he stressed the need to work for the creation of opportunities for more effective performance.

These speeches were followed by a wide-ranging debate that continued during the Friday session. Constributions to the debate on the reports were made by members Gyorgy Adam, Antal Babics, Peter Balint, Mihaly Beck, Otto Bigari and Jozsef Bognar; corresponding members Gyula Csikai and Bela Kalman; member Istvan Kiraly; corresponding members Zoltan Kiraly and Dezso Kiss; members Albert Konya and Pal K. Kovacs; corresponding member (6th Department) Jozsef Lukacs; member Ferenc Martos; corresponding members Janos Meszaros, Karoly Nagy, Gabor Petri; member Karoly Polinszky; corresponding member Janos Prohaszka; members Erno Pungor, Janos Szabo and Sandor Szalai and corresponding member Jozsef Ujfalussy.

One of the most hotly debated topics of the General Assembly was the system of scientific qualifications. A number of remarks were made concerning both conceptual and organizational aspects. Many have urged modernization, strict objectivity, raising the quality of examinations and prerequisites in general as well as reforms of procedure and record-keeping. A number of participants discussed the role and importance of university research. They called attention to the dangers of possible reorganization, i.e. the chance that universities may get second-rate personnel transferred from the institutes. Some saw the solution in increased project grants and fair recognition of the accomplishments of university departments. They noted the direct relationship existing between the size of support and the expected results.

Participants in the debate considered the problems expected in the coming period. They gave a profound analysis of the possible ways of encouraging scientific progress. Questions of organization and management played a prominent role among the proposals. They pointed to reserves in instrument supply and utilization. They called for new forms of cooperation among the various branches of science, priority support for the most urgent topics of research, and better cooperation between the academy and other central authorities. They spoke critically of backwardness arising from a provincial outlook. They stated that progress has been unsatisfactory even in relation to what was possible. They pointed to specifically national tasks that can only be solved with the means available at home.

In the course of the debate they did not lose sight of the close interdependence between science, economic practice and production. Experience shows that the fruits of research are slow to appear in practice; in some cases they are not utilized at all. According to the participants, one of the reasons for this state of affairs is found in the compexlity and bureaucratization of contacts between institutions. They called for cooperation between theoretical and practical professionals in the area of medical science.

One of the characteristic features of the discussion was its openness. The agenda included, in addition to questions strictly internal to science, the tasks of politics, public education and culture. They called for the participation of scientists in public life, asking them for the help they can provide in the field of politics. They said that researchers who look ahead far into the future must anticipate national tasks. They analyzed the contribution of the academy to the development of public education until now. In their view, the academy must accept this role in the future (although under different conditions) because there are still a lot of unsolved problems. Members of the academy can make an important contribution to raising the level of the propagation of science and combating pseudoscientific views.

Janos Szentagothai and Ferenc Marta replied to the statements made in the course of the debate. Then the participants took note of the reports of the Presidium and the general secretary with approval, and adopted a resolution on the tasks facing the MTA.

New Officers of the Academy

At this point the closed session decided on the chief officers of the MTA and made proposals to the Council of Ministers on the naming of the general secretary and deputy secretaries general of the academy. Member Janos Szentagothai was reelected to the post of president of the MTA for a 5-year term. Members Pal Zsigmond Pach, Karoly Polinszky and Andras Somos were elected vice presidents. Members Gyula Eorsi, Jozsef Fulop, corresponding member Zsuzsa Hollan, members Ferenc Marta and Erno Nemecz, corresponding member Janos Prohaszka, members Bruno F. Straub, Kalman Szabo, Bela Szokefalvi-Nagy, Pal Tetenyi and corresponding member Jozsef Ujfalussy were elected members of the Presidium.

The General Assembly elected Norman Ernest Borlaug, Nobel Peace Prize winning plant breeder of the United States, as an honorary member of the Hungarian Academy of Sciences.

The 140th General Assembly of the academy ended with a closing speech by Pal Zsigmond Pach.

Sessions of the Scientific Departments

Sessions and discussions of the scientific departments took place from 5 to 7 May.

The session entitled "The Decade of the 1970's in Hungarian History" took place on 7 May. It was organized jointly by the departments of Hungarian Language and Literature, Philosophy and Historical Sciences, and Economics and Legal Sciences. The session, accompanied by a great deal of interest, was opened by member Pal Zsigmond Pach, vice president of the MTA. This was followed by lectures: "Our Road to the Decade of the 1970's" by Ivan T. Berend; "The Reorientation Stage of Hungarian Economic Development" by member Jozsef Bognar; "Economic Challenge, Social Response" by Kalman Kulcsar, corresponding member; "Problems in Identity Development" by candidate of educational sciences Ferenc Pataki; "Ideological Features of the 1970's in Hungary" by Istvan Hermann, corresponding member; "Interaction of Cinema and Literature in the 1970's" by Istvan Nemeskurty, doctor of literary science; "Trends in Our Linguistic Behavior Patterns in the Recent Stage of Our Social Development" by Sandor Karoly, doctor of linguistics; "Art of the 1970's" by Lajos Nemeth, doctor of art history; and "Question Marks in Our Music Culture" by corresponding member Jozsef Ujfalussy. The lectures commanded a great deal of attention. Their text was published beforehand jointly by the three departments organizing the debate. Long selections appeared in the daily press and some of them will be published in the near future in various periodicals. (Our journal also played a part in these publications: the study by Kalman Kulcsar appeared in Issue No 6, 1980 and this issue contains the lecture by Jozsef Ujfalussy, which could not be published in the preliminary volume due to early publishing deadlines.)

The joint session of the Departments of Mathematics and Physics, Medicine and Biological Sciences entitled "New Aspects of Biophysics" began on the same day. Member Imre Tarjan pointed in his opening speech to the importance of cooperation among various disciplines. The lectures dealt mainly with the biological aspects of the relationships among atoms and molecules. The reports discussed new research into the structure and functions of highly important macromolecules and the functioning of immune systems. The following is a list of lecturers at the session: member Bruno F. Straub, Candidate of Biological Sciences Peter Zavodszky, Candidate of Physical Sciences Laszlo Cser, Doctors of Biological Sciences Sandor Damjanovics and Pal Venetianer, Candidate of Biological Sciences Gyorgyi Ronto, Doctor of Physical Sciences Lajos Keszthelyi and Candidate of Biological Sciences Sandor Gyorgyi. Next day's session, held on 8 May, dealty primarily with the structure and functions of the nervous system, properties of nerve cells and related research results, as well as questions of biological and medical applications. Lectures were given by member Janos Szentagothai, corresponding member Janos Salanki, Doctor of Medical Sciences Otto Feher, Candidate of Biological Sciences Elemer Labos, Doctor of Physical Sciences Jozsef Zimanyi, members Tibor Vamos and Jozsef Tigyi, corresponding member Denes Berenyi, Doctor of Physical Sciences Ede Kapuy and Ferenc Szlavi, deputy technical director of KFKI [Central Physics Research Institute].

The joint session of the Departments of Agricultural Sciences, Biology and Mining and Earth Sciences held on 6 May dealt with the first results of the large-scale research project surveying the natural resources of our country. Following the opening speech by Chairman Ferenc Martos, member of the academy, the ongoing work was discussed by corresponding member and Deputy Secretary General Istvan Lang. (His lecture is published in this issue.)

On the same day, the Department of Mathematical and Physical Sciences held a session entitled "Mathematical Theory of Computation." The session was chaired by corresponding member Laszlo Leindler. Reports were presented by Doctor of Mathematical Sciences Matyas Arato, corresponding member Imre Katai, Doctors of Mathematical Sciences Zoltan Daroczy and Ferenc Gecseg, Candidate of Technical Sciences Tamas Gergely and Candidate of Mathematical Sciences Janos Szelezsan. The afternoon session of the department discussed development trends in physics. Lectures were given by Candidate of Physical Sciences Ferenc Mezei and Doctors of Physical Sciences Peter Szepfalusy, Judit Nemeth (Mrs Dornyei) and Gyorgy Pocsik. The department held an open session on 7 May where, following the chairman's opening speech by member Bela Szokefalvi-Nagy, a report on the activities of the department from 1976 to 1980 was presented by Imre Tarjan.

At the 5 May scientific session of the Department of Agricultural Sciences under the chairmanship of member Erno Csizmadia the situation and tasks of agricultural sciences were discussed following the introductory speech by member Istvan Tamassy, chairman of the department.

The Department of Medical Sciences listened to member Szilard Donhoffer survey the work of the department in the past 4 years. Then the participants discussed the results of new research into brain activity and the nervous system. Lectures were presented by Doctor of Medical Sciences Laszlo Molnar, Candidate of Medical Sciences Istvan Tariska and member Istvan Kornyei. Reviewes of their papers were presented by Candidates of Medical Sciences Gyorgy Artur Fejer, Istvan Pataky, Candidate of Biological Sciences Laszlo Graf, Assistant Lecturer Maria Mazlo, Candidate of Medical Sciences Gyorgy Gosztonyi, Doctor of Medical Sciences Endre Czeizel, Candidate of Medical Sciences Gyorgy Palffy, Chief Physician of the Szombathely Megye Hospital Ferenc Gurzuly and Candidate of Medical Sciences Adorjan Matyus.

At the May 6 open session of the Department of Technical Sciences member Geza Bognar reviewed the work done since the 1976 General Assembly. The afternoon scientific session discussed the technological and energy situation and development directions of aluminum, nonferrous and ferrous metallurgy. The lecturers were Adam Juhasz and Otto Farkas, both doctors of technical sciences. Their papers were reviewed by Janos Zambo, doctor of technical sciences; Janos Horvath, director of the Steel Industry Research Institute, and Gellert Repasi, candidate of technical sciences.

The open session of the Department of Chemical Sciences held on 7 May heard the report of member Mihaly Beck on the work of the department from 1976 to 1980. Five participants were asked to comment on his report: member Janos Hollo; Vice President of the Hungarian Pharmaceutical Association Gyula Horvat; Deputy Director General of OKGT [National Oil and Gas Industry Trust] Bela Peceli; Director of the Budapest Chemical Works Tamas Poros and Candidate of Chemical Sciences and Director of NEVIKI [Research Institute for Heavy Chemicals Industry] Andras Szanto. The afternoon session discussed the problems and tasks of the training of chemists and chemical engineers based on lectures by Department Head and Assistant Professor Imre Szebenyi and member Zoltan Szabo. Their presentations were reviewed by Doctor of Medical Sciences Kazmer Jobst; Director of the Vegetable Oil and Detergent Industry Enterprise Mrs Jozsef Kurucz; Candidate of Chemical Sciences Zoltan Meszaros, research director of the

Chinoin Pharmaceuticals Factory; Balint Nagy, main department head at MEM [Ministry of Agriculture and Food Industry]; and Gyorgy Zador, vice president of the Trade Union of Chemical Workers.

At the 7 June open session of the Department of Biological Sciences member Jozsef Tigyi discussed the activities and goals of the department under the chairmanship of corresponding member Tibor Jermy.

The open session of the Department of Mining and Earth Sciences was chaired by Marton Pecsi, member of the Academy. Member Ferenc Martos reviewed the wide-ranging activities of the department since 1976 and discussed new tasks.

Officials, Department Heads Elected

Budapest MAGYAR TUDOMANY in Hungarian No 7, 1980 p 553

[Text] Appointment of the Secretary General and Deputy Secretaries General of the MTA

Based on the nomination of the General Assembly of the Hungarian Academy of Sciences the Council of Ministers named Lenard Pal, member of the MTA, to the post of MTA Secretary General; member Bela Kopeczi and corresponding member Istvan Lang to the posts of deputy secretaries general.

Newly Elected Heads of Scientific Departments

Following the General Assembly of the Hungarian Academy of Sciences held in May the scientific departments of the academy held meetings to elect officials. The following were elected chairmen of scientific departments:

Department of Linguistic and Literary Sciences: member Miklos Szabolcsi;

Department of Philosophy and Historical Sciences: Ivan T. Berend;

Department of Mathematical and Physical Sciences: member Imre Tarjan;

Department of Agricultural Sciences: member Istvan Tamassy;

Department of Medical Sciences: corresponding member Gabor Petri;

Department of Technical Sciences: member Otto P. Geszti;

Department of Chemical Sciences: member Mihaly Beck;

Department of Biological Sciences: member Jozsef Tigyi;

Department of Economic and Legal Sciences: corresponding member Kalman Kulcsar;

Department of Mining and Earth Sciences: member Ferenc Martos.

The following were elected deputy chairmen in the above order of departments: member Janos Harmatta, corresponding member Andras Mocsy, corresponding member Laszlo Leindler, member Erno Csizmadia, corresponding member Istvan Nasz, member Janos Szabo, corresponding member Gyula Hardy, corresponding member Tibor Jermy, corresponding member Katalin Szikra (Mrs Falus), member Marton Pecsi.

Competition for Research Institute

Budapest MAGYAR TUDOMANY in Hungarian No 7, 1980 (insert)

[Text] Call for Competition

According to applicable provisions of state law and instructions of the secretary general, the appointment of scientific officials of MTA research institutes is for a limited period not to exceed 5 years. Since appointments will expire in many areas this year, the main scientific departments of the MTA are organizing a competition to fill the posts of scientific officials.

The Department of Natural Sciences I of the Central Office of the Hungarian Academy of Sciences announces a competition for the post of scientific director at the Measurement and Computation Technology Research Institute of KFKI [Central Research Institute of Physics];

the Solid State Research Institute of KFKI;

The particle and Nuclear Physics Research Institute of KFKI;

and for the post of deputy scientific director at the Technical Physics Research Institute. The appointments are from 1 January 1981.

Applicants must satisfy the following requirements:

--university graduation and scientific degree;

--significant scientific accomplishments in one of the areas of research within the scope of the work of the institute, or substantial experience in promoting the application of research results;

--experience in running a research institute or a major research unit.

The application must include:

--the present employer, job classification, rank and salary of the applicant;

--a description of the professional work and accomplishments of the applicant;

--a list of papers, books and other works of the applicant with precise bibliographical references;

--indication of scientific degrees, honors and competence in foreign languages;

--in the case of applications for the post of director, the applicant's plans for future activities of the institute.

Applications must be accompanied by:

--notarized copies of certificates;

--detailed curriculum vitae (two copies);

--certificate of moral conduct.

Academic researchers need not include the documents mentioned above.

The rank and management appointment of scientific director and deputy scientific director are governed by Decree No 16/1977 (1 December) of the Ministry of Labor and directive No 1/1978 (A.K.1) MTA-I of the secretary general.

Applications for the post of director must be received by the secretary of MTA, (for deputy director, by the appropriate deputy secretary general) at the Department of Natural Sciences I of the MTA Central Office (1051 Budapest, Munnich Ferenc u.7) no later than 30 days after the publication of the call for competition.

Budapest, 1 July 1980

signed
Mihaly Sandor
head of main department

The Department of Natural Science II (Biology) of the Central Office of the Hungarian Academy of Sciences announces a competition for the post of scientific director of

--the Biochemical Research Institute of the Szeged Biology Center of the MTA;

--the Biophysical Institute (Szeged) of the Szeged Biology Center of the MTA;

--the Soil Science and Agrochemistry Research Institute of the MTA;

--the Martonvasar Agricultural Research Institute of MTA;

and for the post of deputy scientific director at

--the MTA Veterinary Medicine Research Institute;

--the MTA Experimental Medicine Research Institute;

--the MTA Biological Research Research Institute in Tihany;

--the MTA Agricultural Research Institute in Martonvasar;

--the MTA Soil Science and Agrochemistry Research Institute;

--the Szeged Genetics Institute of the Szeged Biology Center of the MTA;

--the Szeged Biochemistry Institute of the Szeged Biology Center of the MTA;

--the Plant Biology Institute of the Szeged Biology Center of the MTA. The appointments are to start on 1 January 1981.

Applicants must satisfy the following requirements:

--university graduation and at least a candidate degree;

--substantial accomplishments in a research area within the scope of the institute;

--applicable experience at the head of a research institute, university department or science section.

The application must include:

--indication of the present employer, job classification, rank and salary of the applicant;

--description of the professional activities and accomplishments of the applicant;

--a list of papers, books and other works of the applicant with precise bibliographical references;

--indication of scientific degrees, honors and knowledge of foreign languages;

--in the case of applicants for directorships, ideas regarding the functioning of the institute.

Applications must be accompanied by:

--notarized copies of all certificates;

--two copies of a detailed curriculum vitae;

--a certificate of moral conduct.

If the applicant is presently employed by the MTA then the application must include only the plan regarding the scientific program of the institute and its implementation.

The rank and appointment of scientific director and deputy scientific director are governed by Decree No 16/1977 (1 Dec) of the Ministry of Labor and directive No 1/1978 (A.K.1) MTA-F of the secretary general.

Applications for directorships must be addressed to the MTA secretary general, for deputy directorships to the appropriate deputy secretary general, at the Department of Natural Sciences II (Biology) of the Central Office of the Hungarian Academy of Sciences (1051 Budapest, Munnich Ferenc U. 7) no later than 30 days after the publication of the call for competition.

Budapest, 1 July 1980

signed
Istvan Teplan
head of main department

The Department of Social Sciences of the Central Office of the Hungarian Academy of Sciences announces a competition for the post of scientific director at

--the Institute of State and Legal Sciences;

--the Ethnography Research Group;

--the Archeology Institute;

--the Institute of Musicology

and for the post of deputy scientific director at

--the Industrial Economics Research Group;

--the Economics Institute;

--the Ethnography Research Group;

--the Archeology Institute;

--the Institute of Musicology

and for two posts of deputy scientific director at

--the Institute of State and Legal Sciences. The appointments will start from 1 January 1981.

Applicants must comply with the following requirements:

--university graduation and at least a candidate degree;

--significant scientific accomplishments in an area of research within the scope of the institute applied for;

--applicable experience at the head of a research institute or a large research unit.

The application must include:

--in the case of applicants for directorships, a plan for the scientific program of the institute and its implementation;

--indication of the present employer, job classification, rank and salary of the applicant;

--description of the professional work and accomplishments of the applicant;

--precise bibliographical list of books and papers written by the applicant;

--indication of the scientific degrees, honors and knowledge of foreign languages.

The application must be accompanied by:

--notarized copy of certificates;

--two copies of a detailed curriculum vitae;

--certificate of moral conduct.

If the applicant is a present employee of MTA then the data and attachments listed above need not be included with the application.

The rank and appointment of scientific director and deputy scientific director are governed by Decree No 16/1977 (1 Dec) of the Ministry of Labor and Directive No 1/1978 (A.K.1) MTA-F of the secretary general.

Applications for directorships must be addressed to the secretary general of the MTA, and those for deputy directorships to the appropriate deputy secretary general of the MTA at the Department of Social Sciences of the Central Office of MTA (1051 Budapest, Munnich Ferenc u. 7) no later than 30 days after the publication of the competition.

Budapest, 1 July 1980

signed
Ferenc Rottler
head of main department

Detailed conditions of the competition are published in issue No 7, 1980 of the AKADEMIAI KOZLONY.

9164
CSO: 2502

BRIEFS

INTERNATIONAL SCHOOL OF BIOPHYSICS--Under the auspices of the Hungarian Academy of Sciences, the Hungarian Biochemical Society and Institute of Biophysics of the Biological Center of Szeged, as well as with the support of UNESCO, an international school for young researchers has opened in Szeged. In addition to Hungarians, the student body consists of college graduates from all four quarters of the globe. The faculty is made up of renowned scientists from the USA, England, Switzerland, the Soviet Union and other countries. The students will acquire fuller knowledge of bacteria molecules which convert light into electric energy. [Text] [Budapest NEPSZABADSAG in Hungarian 6 Sep 80 p 4 WA]

CSO: 2502

BRIEFS

FIBER-CERAMICS, ACOUSTICS RESEARCH--At the same time, the Academy of Mining and Metallurgy, which is included in preparing plans for the coordination of particular problems, fulfills, among other things, the function of coordinating the following: within the CEMA framework, problems pertaining to high-temperature corrosion, machinery for the cement industry and noise and vibration control; interministerial problem of basic research--"Principles of ferrous metallurgy and their practical application;" and ministerial problems of the Ministry of Science, Higher Education and Technology--"Obtainment of fiber-ceramic materials and reinforced fiber composites" and "Development and improvement of methods for reducing engine noise and vibration." [Excerpt] [Warsaw PRZEGLAD TECHNICZNY INNOWACJE in Polish No 27, 6 Jul 80 pp 23-24]

CSO: 2602

END

JPRS 76587

8 October 1980

East Europe Report

SCIENTIFIC AFFAIRS

No. 684

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JPRS 76587

8 October 1980

EAST EUROPE REPORT

SCIENTIFIC AFFAIRS

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STATE OF HUNGARIAN, CEMA INTERFERON RESEARCH, PRODUCTION REVIEWED

Budapest HETI VILAGGAZDASAG in Hungarian No 34, 23 Aug 80 pp 33-35

[Interview with Dr Istvan Foldes, head of the Microbiological Research Group of the Hungarian Academy of Sciences]

[Text] Dr Foldes is 58 years old. He has been directing the 45-member research group dealing with interferon and tumor virus research since 1973. In addition to the foregoing, Dr Foldes is coordinator of collaboration in the interferon research being conducted by the academies of sciences of the CEMA countries. In the following, he tells the reporter of HVG--HETI VILAGGAZDASAG--what progress Hungarian scientists have made in their investigation of interferon.

[Question] Let me begin with the question of greatest interest to the public. Are interferon preparations available in Hungary and has there been any success in curing cancer patients with interferon?

[Answer] Briefly, not at present. New drugs may be used on humans in our country, quite rightly, only after extensive testing and checking. Production and testing of interferon are still in the experimental stage. However, this does not mean that no one in Hungary has received interferon preparations. I am aware of the fact that a certain quantity of such preparations were obtained through connections from Finland for the treatment of cancer patients. I must add that since interferon has received such wide and, in some cases, irresponsible and misleading publicity in the press, our institute has been besieged daily by the sick and their relatives, even by physicians, with demands that we make interferon available to them. We are under great pressure and we feel that it is up to the press to inform the public correctly.

[Question] I don't wish to go into the matter of information policy, but according to what you have said, you are dissatisfied with interferon propaganda.

[Answer] You must realize that in this area, as in all kinds of research, progress has to be made step by step. Biologists must advance beyond partial issues which seem nonessential to them before they can present for the finished material. What I mean is that they [reporters] should search for reality rather than the sensational. We could say nothing about interferon and then the public would have nothing to question. However, I feel that this is the wrong approach. Instead, people should understand that we are dealing with a medication highly significant on a long-term basis, but that is is still being tested and it is necessary to wait until it has been determined for what diseases and under which circumstances it can be used.

[Question] Is interferon being produced in Hungary?

[Answer] Inteferon is being studied at the Institute of Microbiology of Szeged Medical University as well as by the Microbiological Group of the Hungarian Academy of Sciences. The interferon needed for experiments conducted by our Group is produced largely by us; we are self-suppliers, so to speak. However, a process for the production of interferon has already been evolved at Szeged and, to the best of my knowledge, discussions are under way with the United Pharmaceutical and Nutriment Factory concerning the manufacture of raw interferon. It has been suggested that the preparation thus obtained should be sent abroad for purification. I can say nothing specific about the rentability of production. However, I will note that I stated as early as 1977 that domestic research on interferon should be concentrated and expanded. Doing this would have resulted in considerable economic as well as scientific gains. Unfortunately, the idea was stillborn so that we are lagging somewhat in this area. The Kari Cantell laboratory of Helsinki which has pioneered the preparation of interferon for the past 20 years and the Finnish Red Cross are reaping the tremendous income derived from sales of it.

[Question] Are you satisfied with the current status of Hungarian interferon research?

[Answer] A researcher can never be satisfied: this is a kind of professional prejudice. The greatest problem is the cost of interferon research. Actually, the culture media, the tissue cultures used in interferon preparation are the most costly and our situation is made more difficult by the fact that imported chemicals are needed for preparation of such media. Thus the national economic budget determines how much can be spent on interferon research.

[Question] When will interferon finally become a medication?

[Answer] Within 5 years. Raw interferon will be produced first, then purified variations. I am convinced that Hungary will make it, too, and that it will become commercially available here. However, no one should expect us to say today for what illnesses physicians will prescribe interferon preparations.

Last month the CEMA countries agreed on where and how they could collaborate in interferon research. However, no agreement has been arrived at concerning cooperation in the manufacture of interferon. Nevertheless, some socialist countries have begun experimental production of interferon.

According to information received from the Microbiological Group of the Academy, the Soviet Union han not only produced raw interferon, but preparations made from it are available on prescription there. At present these preparations are being used solely for treatment and prevention of certain viral infections such as influenza. They cannot be used for the treatment of tumors.

Physicians from Zagreb report that experiments indicate that interferon is especially effective in treatment of cancers of the cervix and the breast. However, extensive and thorough testing has not begun there yet either.

CSO: 2502

BRIEFS

CSSR AIRLINER FOR USSR--Czechoslovakia and the USSR signed recently an intergovernmental agreement on development of a new airliner designated L 610. The LET aircraft factory in Uherske Hradiste, which has been producing L 410 UVP airliners for the USSR, expects to produce the L 610 within the Eighth Five-Year Plan (1986-1990). Most of the L 610 aircraft will be delivered to the USSR. [Prague MLADA FRONTA in Czech 4 Sep 80 p 2]

CSO: 2402

REPORTS ON SCIENTIFIC ACTIVITIES

Original Metallurgical Method

Sofia BULGARIA TODAY in English No 9, 1980 p 20

[Article by Roumen Ivanchev: "An Original Metallurgical Method"]

[Text] In recent years there has been an ever greater drive to shorten the road along which scientific developments travel from the research institutes to the industrial enterprises. At Plovdiv's Dimiter Blagoev Non-Ferrous Metal Combine, this road has been cut down enormously, both literally and figuratively speaking. Next-door to the plant is the five-storey building of the Non-Ferrous Metal Research Institute. Its employees are ready at any time to take off their white overalls and put on the black aprons of metallurgical workers and take you to their spacious laboratory, the combine itself. Let us try to follow the path along which zinc concentrate goes until it turns into silver-white metal blocks bearing the respect-inspiring figures 99.96, 99.975 or 99.99, which denote the purity of the metal. Chemical engineer Ivan Enchev and his research team have evolved an original method for the electric extraction of non-ferrous metals and their alloys. It has already been patented in the USSR, Japan, the USA, Canada, Beligum, Spain and Austria.

Chemically pure metals are electrically extracted in electrolytic baths. The hydro-active method, used by more than 70 per cent of the world's zinc producers, while having doubtless advantages, such as high purity of the final product, lower environmental pollution and easy servicing, has at the same time a big drawback: it consumes a tremendous amount of electricity.

The new method is based on alternating polarity of the electric current, which results in reversive currents. According to a pre-set programme, brief spurts of electricity are charged in a direction counter to that of the main current. This brings about big alterations in the electrical chemistry of the extraction, helping to achieve a smooth metal surface, a reduced voltage between the electrodes, and lower electricity consumption. It also lowers the degree of zinc's oxidation in the inductive furnaces. The new method has increased productivity up to two-fold, and has cut electricity consumption by about 100 kWh per ton of zinc. Another great asset is that the new method can be easily introduced without great alterations in the standard electrolytic equipment.

The new method is already being successfully used in copper purification at the Georgi Damianov Copper Mill in the town of Srednogorie, and has been sold as a licence to several leading manufacturers abroad. It has been awarded gold medals at international fairs in Plovdiv, Brussels and Nurnberg. Two years ago, the Spanish Asturiana de Zinc Company bought the licence for reversive electric extraction. Last year, the circuit of the reversive rectifier, which is one of the main components, was tested jointly by Bulgarian and West German experts, and proved to have perfect qualities.

It is sufficient to mention in conclusion that about four million tons of zinc are produced on our planet each year, in not more than 60 modern plants.

ROUMEN IVANCHEV
Mechanical Engineer

Ion 50 Process

Sofia BULGARIA TODAY in English No 9, 1980 p 21

[Article by Zhivko Dinkov, Dimitrov Prize Laureate: "A High Achievement"]

[Text]

A modern and very promising method of chemico-thermal surface processing of machine parts and tools has been ever more widely used in Bulgaria in recent years. Known as ion nitrogenation, the method has been enjoying enormous popularity in industry, and has successfully replaced the old, unprofitable and time-consuming process of the conventional gaseous nitrogenation; it has also shown what the future trends in chemico-thermal processing of metals are likely to be.

When this ion nitrogenation method is used, the metal parts which are placed in a vacuum are saturated with nitrogen by the surrounding bluish-violet low-temperature plasma; thus their surface becomes extremely hard and they are more lasting, with a longer exploitation lifetime. The main advantages of ion nitrogenation are: a three- to five-fold reduction in the time taken for the whole process, an even spread of the hard surface layer regardless of the configuration and size of respective parts, the regulated formation of that layer according to technological requirements, a high level of hygiene in the work-place and complete innocuousness for the personnel and the environment.

The first laboratory researches into this method were carried out at the V.I.Lenin Institute of Mechanical Engineering by a team headed by Professor Dimiter Bouchkov, D.Sc. In spite of the numerous difficulties in research, development, technology and technique, the method which is still a novelty in world practice, was quickly transferred into industrial practice on a wide scale. The installations necessary for using this method are produced in a range of 15, 50, 100 and 150 kW output power, according to the different requirements in industry. Fifteen installations for ion nitrogenation have already been brought on stream in Bulgarian plants.

Many companies from abroad are already showing interest in these installations of Bulgarian make. At the Leipzig International Fair in March 1980, the ION-50 installations were awarded a gold medal. The Machinoexport Co. of Sofia is at present fulfilling several orders placed for such installations by foreign customers.

ZHIVKO DINKOV
Dimitrov Prize Laureate

Silverless, Micro-electronic Innovation

Sofia BULGARIA TODAY in English No 9, 1980 p 21

[Article by Vassil Simeonov: "New Elements to an Old Scheme"]

[Text]

About thirteen years ago the Bulgarian scientist Yordan Malinovski added essentialy new elements to the scheme which then seemed adequately to reflect the photographic process in the sensitive films with coatings of silver salts. His discovery was a challenge to the photographic tradition of that time. He proved that besides using the expensive silver salts which are in short supply in the world, one can use other compounds sensitive to light in photography. Wide interest was shown in the new photographic system – films which were not emulsions of gelatine and silver bromide but ones which were obtained in evaporation in a vacuum of silver bromide, tin iodite, tin bromide, thallium compounds and arsenic sulphides. The advantages of the new materials in electronics appeared obvious in theory – much finer details could be recorded on these films and their separating qualities would surely be a hundred times better than those of the emulsion plates. The way was thus paved for the silverless systems and for photographic materials to be applied in micro-electronics.

That was a scientific discovery which came in response to the requirements in practice. It should be pointed out, however, that here it was not a matter of ordinary photography which at that stage was hardly threatened by competition from the silverless systems. But in microelectronics the innovation was of great significance.

At present Yordan Malinovski is a corresponding member of the Bulgarian Academy of Sciences, a professor, doctor of chemistry, Laureate of the Dimitrov Prize, honorary member of the Royal Photographic Society (Great Britain), member of the editorial boards of prestigious scientific journals. The Central Laboratory of Photo Processes (CLPP) with the Bulgarian Academy of Sciences is a special academic unit, comprising traditional research laboratories and studies. It has vacuum installations, ingenious process-lines, pilot installations for semi-industrial experiments and bright halls equipped with modern apparatuses.

Visitors to the Academy from abroad make a point of seeing this laboratory. They often ask: 'Has all this been created without any previous experience in this field? Are all the people here working on the same problem?' They invariably say they are sure that the work in these conditions is bound to produce good results. But are these just flattering comments made by courteous guests? The achievements of the laboratory have been qualified as 'phenomenal' by the 'big noises' in the science of photography at the International Symposium on Research into the Photoprocess and at the International Congresses of Photography in Dresden and Rochester (seat of the prestigious Kodak firm).

Yet another criterion of the value of the Bulgarian invention is the large number of patents for various silverless photographic systems issued in the FRG, Italy, Britain, Belgium, France and the USA.

Professor Malinovski spends only a short time in the office allotted to him as laboratory director.

He is a theoretician having made an outstanding contribution to the theory of the photographic process. He is an experimenter having built his theory on experience gained in practice, which he believes is the most essential thing. He is an organizer. Few people would dare take a path full of uncertainties to something no one before had attempted to create.

The laboratory is now developing technologies for the production by evaporation of films of silver bromide and compounds containing no silver – photographic material intended for the requirements of microelectronics, printed circuit 'memories' of computers, lithographic materials and materials for further research into the photographic process. It is a responsible work placing great demands on the researchers and their team leader. The work of Professor Yordan Malinovski who likes to take part in each experiment, to consider each new idea, is a challenge to the traditions in this field.

VASSIL SIMEONOV

CSO: 2020

TECHNICAL SPECIFICATIONS OF COMPUTER, ELECTRONIC PRODUCTS

Sofia RADIO TELEVIZIYA ELEKTRONIKA in Bulgarian No 5, 1980 inside cover, both sides of back cover

[Advertisements for electronic equipment; photos at end of article]

[Text] The ES9004 Magnetic Tape Data Processor [Inside front cover]

The ES9004 is designed for direct taping of keyed-in data. It provides an opportunity for retrieving a certain data block for checking and when necessary, correcting the taped data.

The unit has a built-in buffer memory which stores the entire data block before being recorded on tape. This makes it possible to immediately correct the input mistakes noted by the operator; this is done by turning back the address of the storage and putting in the correct sign.

The taped data are recorded in blocks 80 or 160 signs long. The device is equipped with interlocking of the keyboard during the taping and read cycle after recording, and this makes it possible for the operator to maintain a constant pace in keying in the data.

During the record cycle, the contents of the buffer storage are not destroyed. The data are kept for checking and this is done by direct reading after recording. The read data from the tape are compared bit by bit with the data stored in the memory.

In the "check" mode, the data blocks which are to be checked are read and fed into the storage one by one. Each sign of the block is re-entered by the keyboard from the source document. The code of the introduced sign is automatically compared with the storage code. If the two codes are the same, the operator can continue the check.

In the "retrieval" mode, a given data block is retrieved automatically by comparing each taped block with an identifier which has been keyed in previously into the storage. Retrieval is carried out at a speed of approximately 1000 blocks per minute.

Each ES9004 can be equipped with a block indicator for the current data block.

At the client's request, the ES9004 can carry out the following functions:

1) The possibility of transferring data from one unit to another;

2) The possibility of reprinting the data recorded on tape of the printer;

3) The possibility of feeding in data from a punch card reader.

Technical Specifications:

Bit density	--32 bit/mm
Recording method	--NPZ-1
Tape speed	--39.2 cm/s
Capacity of buffer storage	--160 bytes
Block length	--80 and 160 bytes
Recording format	--ISO system
Basic operating modes	--data input, check and retrieve
Other modes	--input of program, program check, print, input from punch card reader
Programs	--two independent ones
Indication	--block-by-block
Automatic functions	--doubling, fast-forward, fast-back
Power	--220 V ±10%

Exporter: Izotimpex VTO
51 Chapaev Street
Sofia Bulgaria
Telephone: 73-61
Telex: 022731, 022732

The IZOT 250 Office Computer [Inside back cover]

The IZOT 250 office computer is a modern device for processing economic information. It possesses high technical and economic indicators and a high calculating speed. The IZOT 250 office computer uses MOS integrated circuits with a high degree of integration. The use of the floppy disc storage makes is possible to reprocess the information in a minicomputer or a large electronic computer.

Technical Specifications

Control Unit	
Internal storage	--12 K
Permanent storage	--18 K
	--512 independent digital registers; 256 text registers, 10 constant registers

Arithmetic operations	--addition, subtraction, multiplication, division, percentages;
Bit length	--14 bit units
Display	--digital for inputting data and intermediate results; working--for state of system.
Keyboard	--alphanumerical (Latin and Cyrillic); working; digital.
Printer	--speed 30 signs per second; 156 signs per line; 380 mm paper width; tabulating; changeable printing disc; uses punch paper and blanks.
Floppy disc storage	--250 K per disc; 77 tracks.
Power	--220 V, 50 Hz.
Programming	--with a specialized problem-oriented input language (easily learned with a minimum knowledge of programming) and it has a built-in translator

Exporter: Izotimpex VTO
51 Chapaev Street
Sofia Bulgaria
Telephone: 73-61
Telex: 022731, 022732

M-101 Digital Multimeter [Outside of back cover]

The M-101 digital multimeter is designed to meter direct and alternating voltage, direct and alternating current and resistance.

It is to be used in industrial and scientific laboratories, production shops, school labs, service bases and elsewhere where a combined portable device is required. It is designed with integrated circuits.

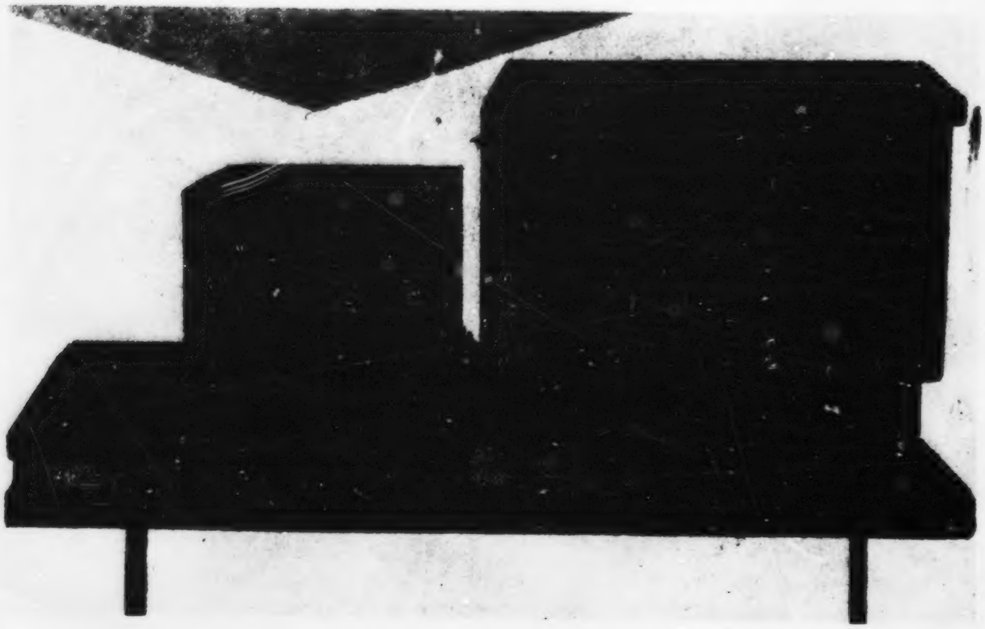
Technical Specifications:

Metering of direct voltage:	--ranges 0.2, 2, 20, 200, 1000 volts.
Metering of alternating voltages: (from 50 Hz to 10 kHz):	--ranges 0.2, 2, 20, 200, 750 volts.
Metering of direct current:	--ranges 0.2, 2, 20, 200, 2000 mA.
Metering of alternating current (from 50 Hz to 10 kHz)	--ranges 0.2, 2, 20, 200, 2000 mA.
Metering of resistance:	--ranges 0.2, 2, 20, 200, 2000 kΩ.
Dimensions:	--270x150x 82 mm.
Weight:	--1.9 kg.

Producer: Pravets Instrument Building Plant

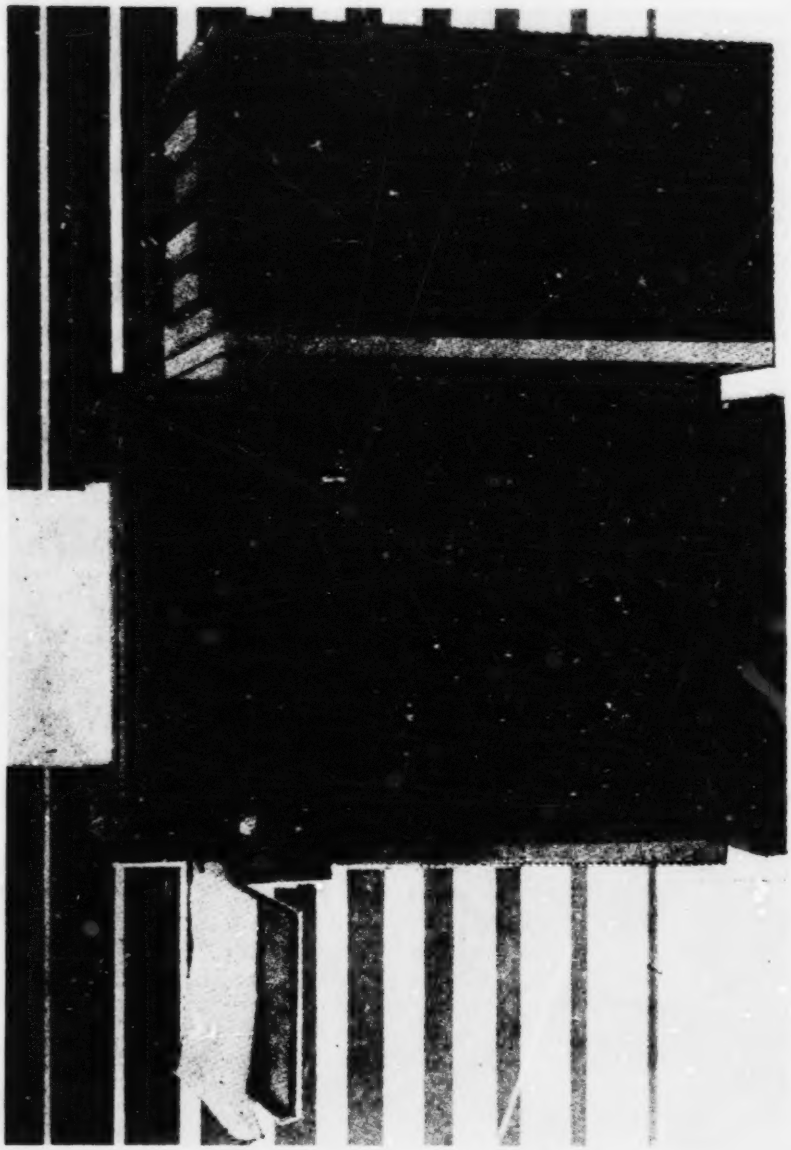
Exporter: Izotimpex VTO

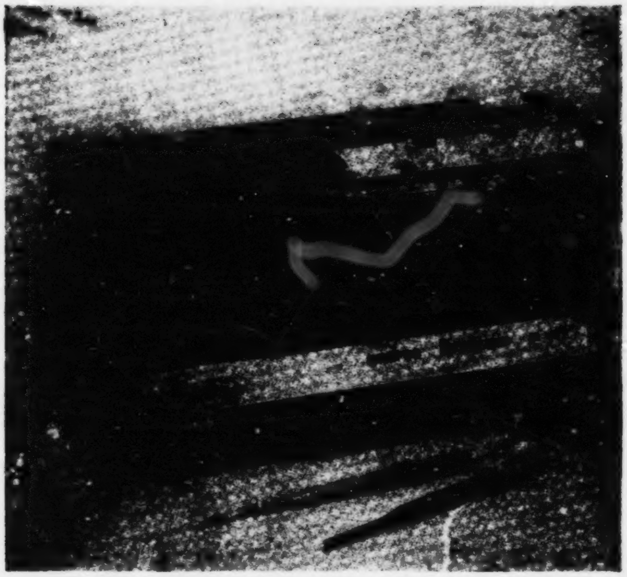
[Photographs]



ES9004 Tape Processor

IZOT 250 Office Computer





M-101 Digital Multimeter

10272
CSO: 2202

BRIEFS

ORE DEPOSITS DISCOVERED IN MORAVIA--Preliminary geological investigation in the gold-bearing area of Zlata Hora-West has revealed a deposit of about 10 tons of gold. Prognosis by geologists from Prague Charles University of large deposits of lead, zinc, copper and silver in the Svratka Dome [Svratecka klenba], Moravia, has been confirmed by experts from GEOINDUSTRIE in Jihlava. Preliminary estimates point out to deposits of about 15-25 million tons of lead, zinc and silver-bearing ores. Also promising are the areas of Lacnov, Jesenice and Domasov-Lazanky, where geological investigation has been in progress. The biggest surprise to experts is the rather high content of silver in some of the ores. After depletion of the Pribram silver-bearing deposits, the new deposits represent a great hope for the CSSR economy. Prognosis prepared by Czechoslovak geologists more than 3 years ago gives the CSSR a realistic target to increase by 1990 production of lead and antimony 3-fold, copper 2-fold, zinc 3.6-fold, tin 7.6-fold, iron by 130 percent and tungsten by 180 percent. [Prague ZEMEDELSKE NOVINY in Czech 24 Sep 80 p 1]

TURBOGENERATORS FOR CUBA, EGYPT--SKODAEXPORT will deliver three additional turbogenerator sets to the Nuevitas power station in Cuba. Output of these three sets will be 125 megawatts. The second turbogenerator set passed tests and is being shipped to Cuba. The previously delivered three turbogenerator sets have an output of 64 megawatts. Skoda Works in Plzen have also delivered two 110-megawatt sets to Egypt, which have been operational at Kapr el Davar. A third set is being installed and the fourth one is slated for delivery in the next few months. [Prague LIDOVA DEMOKRACIE in Czech 23 Sep 80 p 3]

INDUSTRIAL ROBOT PRODUCTION EFFORT--Czechoslovakia began development of industrial robots about 10 years behind other developed countries. Through accelerated effort in this field approximately 3,000 industrial robots and manipulators are expected to be manufactured and utilized in production by 1985, their number reaching 30,000 by 1990. [Prague SVOBODNE SLOVO in Czech 3 Sep 80 p 1]

CSO: 2402

BACKGROUND OF HUNGARIAN PARTICIPATION IN SPACE RESEARCH HIGHLIGHTED

Budapest NEPSZABADSAG in Hungarian 24 Aug 80 p 15

[Article by Pal Gabor Peto: "How Many Hungarian Astronauts Are There? The Social Background to Hungarian Space Research: KASZ"]

[Text] When we say Hungarian space pilot, everyone naturally thinks first of Bertalan Farkas, the research space pilot of the Soyuz 36, and of Bela Magyari, the other trained Hungarian space pilot. Even though it is correct to think of them first, it is a mistake to regard them as the only Hungarian space pilots and space researchers, or in a word, astronauts. (It is because of this word's comprehensive nature that we use the one foreign word instead of the two Hungarian expressions.)

If we interpret the word astronaut in this way, it is more readily understandable when we say that there are several hundred Hungarian astronauts.

On first hearing, this statement may be surprising, but in this way it is true. Let us only think a moment: all those, mostly unheralded, experts who prepared the space flights, constructed the equipment, and made the special materials for the spaceship--who could deny that they, too, are participants in the space flights? And those who process the data coming from artificial satellites for scientific or practical uses? Obviously they are also (land) astronauts, and it would be ungrateful and irrational of us to underestimate their role.

It Was Started by Twenty-Three Men

Astronautics is a complex science, interdisciplinary to use a word frequently heard today, because mathematicians, physicists, astronomers, geophysicists, metallurgists and various kinds of engineers are indispensable participants, as well as geodetists, missile experts, computer technicians, biologists, physicians, and we could continue with the list. In this sense, Hungarians participated in space flights quite a few years before Bertalan Farkas' flight. Many Hungarian pieces of equipment have been flown on Soviet space research missiles and on Intercosmos satellites. Hungarian specialists also participated in processing results. For this very reason it is worth directing attention to an organization which had an important role in the birth of Hungarian astronautics and which is still today voluntary and self-motivated. Its official name is KASZ (Central Astronautics Department) of the MTESZ (Federation of Technical and Natural Science Association).

At the beginning of the 1950's, astronautics appeared to be a very remote matter, although astronautic associations have functioned in many countries for decades (in the Soviet Union since 1924, in Germany since 1927, in the United States since 1934, and in Great Britain since 1933). But the experts knew that we were on the threshold of the space age, and in fact we were nearing the "International Geophysical Year," which in July 1957 started the great international scientific research cooperation. And they intended to use artificial satellites for research in that very year. The American press wrote excitedly about the world's first artificial satellite, American "naturally." At the 1955 congress of the IAF (International Astronautic Federation) in Madrid, the academician and leader of the Soviet delegation, Sedov, only said sparingly that Soviet experts also were working on making an artificial satellite.

Articles about astronautics slowly increased in the press. Then on 26 May 1956, 23 experts established the Astronautic Committee within the central astronomical department of the TIT (Society for the Propagation of Scientific Knowledge). They elected Gyorgy Kulin, the well-known astronomer, as president; and as secretaries Professor Jozsef Sinka and astronomer Ivan Almar. The members included astronomers, engineers, physicians, physicists, and many other experts.

From a Committee to a Department

Since the committee was a part of the TIT, its members occupied themselves mostly with the propagation of information: delivering lectures and writing articles. They collaborated in writing the first Hungarian book on space flights, "Astronautics," which was published by Gondolat Publishers in the summer of 1957. It could not have been at a better time: on 4 October the first artificial satellite, the Soviet Sputnik, was put into space, and interest in the subject grew to an incredible extent. At the TIT Attila Jozsef Free University a series of 15 lectures was delivered in 1958-1959.

But by then, in addition to information propagation, the seeds of scientific work also began to sprout in the activity of the Astronautics Committee. In April 1958 it organized a 3-day astronautical scientific meeting; it collaborated in the work of the Sputnik tracking stations organized by the MTA [Hungarian Academy of Sciences] Astronomical Observation Institute, and in the exchange of information gained therein. One of the members of the committee, Tibor Horvath, established an artificial satellite tracking station at Rakceliget.

In December 1959 the Astronautics Committee left the TIT and became the Central Astronautics Department of the MTESZ. From many points of view this was an important change, especially because in this way KASZ could now easily draw into its ranks the members of other MTESZ associations, as well as physicians and lawyers, and thus it could begin the exchange of scientific information deriving from the work of its members. The work of KASZ was given impetus by the fact that Albert Fono, corresponding member of the MTA, was elected chairman, as he was also one of the pioneers and outstanding personalities of missile technology. Also joining the leadership were Gyorgy Erdi-Krausz, engineer, who occupied himself with astronautics as early as the 1930's, and Erno Nagy, engineer who spoke a half dozen languages fluently and subsequently delivered lectures on missile technology at the Lorand Eotvos University of Arts and Sciences.

In this period between 1959-1972, which was unfortunately closed by the deaths of Albert Fono and Gyorgy Erdi-Krausz, KASZ expanded into an organization of several hundred people with the participation of KASZ experts and university students. By 1962, under the name of the Hungarian Astronautics Association, it became a member also of the IAF.

To follow results in the field, it was important that KASZ published a collection of foreign-language abbreviations relating to space astronautics, and moreover it worked out the Hungarian terminology. It organized many lectures, conferences and film showings, and it served as the forum for the reports of Hungarian experts who had visited abroad (for example, at congresses).

More important, however, than individual lectures, were the so-called large programs. These consisted of a scientific lecture and discussion series extending over a number of days. Such was the first scientific conference organized in October 1967 with a number of Soviet participants. KASZ has played a great role since 1972 in the organization of the annual Ionosphere-Magnetosphere Seminar, in the deliberations of cosmic geodesy, and in discussions and conferences on remote signal perceptions and the use of artificial satellite photographs.

Famous foreign scientists also frequently hold lectures at KASZ when they travel to Hungary. It has had as guest Todor Karman, the astronautics pioneer of Hungarian origin, academician Petrov, Soviet and American astronauts, and others.

The Fourth Decade

The above-listed lectures and conferences carry us over partly to that phase of KASZ history which began in 1972. Since then, the chairman of KASZ has been Ivan Almar, doctor of physics, and its secretary is Andras Horvath, astronomer and candidate. The work of this period was obviously defined by the accelerating development of astronautics. A number of work committees and local organizations were developed in KASZ; for example, the space law committee; the "earth-photo work committee," which dealt with questions of evaluating practically the pictures taken from artificial satellites and serving earth-surface and meteorological observations; and the space medicine working committee.

Besides the semiannual ASTRONAUTICS BULLETIN--which carries the articles of domestic and foreign writers and regularly publishes data on space vehicles in orbit--an important publication of KASZ is a series of books on the materials from our big programs and our conferences. Of these about 30 volumes appear every year. And KASZ experts are preparing the "Astronautics Lexicon," a work of 960 pages published jointly by the Academy Publishers and the Zrinyi Military Publishers.

In discussing this manifold activity--without trying to be exhaustive--we must emphasize the characteristic fact that KASZ is the social organization of Hungarian astronautic research. The members are held together by their deep interest in the field, practically without any kind of formalities (it does not even have a membership fee). Those who have carried out or are carrying out, or directing, Hungarian astronautic activity--all the way from the planning of equipment to the selection of pilots--from an official position or on state commissions, have been for long, without exception, members of KASZ; or if they are not, they turn with confidence and great benefits to this organization that is now almost 4 decades old.

The anniversary will be in May 1981, when a large number of jubilee celebrations will be held together, and therefore KASZ has scheduled a scientific conference on the occasion of the 20th anniversary of Gargarin's space flight and the 100th anniversary of the birth of Albert Fono and Todor Karman.

A preliminary review, prior to the spring mass review of KASZ, shows that there are now about 500 experts in Hungary who are occupied with astronautics. Some of them are well known to the public because--although the dissemination of information is not the main task of KASZ--the members gladly give talks on the new results of their science via radio, television, and the most varied kinds of newspapers.

6691
CSO: 2502

VT 20 MICROCOMPUTER SYSTEM AT ZAHONY TRANSLOADING STATION

Budapest SZAMITASTECHNIKA in Hungarian Jun 80 p 6

[Text] Complementing the article on the Automatized Information System of Zahony that appeared in SZAMITASTECHNIKA, Vol XI, No 4, we will describe the development of the VT [Videoton] 20/20 microcomputer at the SZAMKI [Computer Technology Research Institute].

The Task

The task of the information centers (IK) to be developed in the Zahony transloading area is to meet the demands of data registration (data on the trains), information and operative decision preparation that follow from the local technology. It is practical to use in these places an intelligent terminal with complex functions which will relieve the central power resources in a way that itself will partly meet the demands above.

What kind of hardware and software are needed to carry out this task?

Considering the large number of input data (approximately 400,000 kar per day), data input must be done at several points.

Because of the diversity of the preprocessing, the collected data must be put in temporary storage which necessitates the use of a high-capacity (5-10 Mbyte) background.

The large number of functions to be carried out simultaneously demands an efficient distribution of power resources.

Contact with the central computer and minimalization of data input and feedback time demands a high-level disconnecting system within the intelligent terminal.

For making local conversions and proofs, an input/output with punched tape and a possibility for pressing are needed.

The above requirements are completely satisfied, as far as the hardware is concerned, by the VT 20/20 microcomputer system recently developed by the Videoton. The structure of the system is shown in Figure 1.

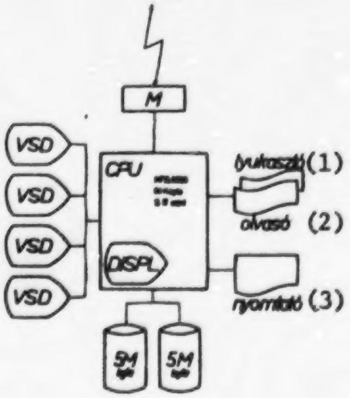


Figure 1

Key:

1. Puncher
2. Reader
3. Presser

The microcomputer's disconnecting system aids in serving the real-time environment, and the simultaneous implementation of the various tasks must be carried out by the software system with time division built on this disconnecting system.

On the basis of the above, the software system is based on two fundamental modules: the governing monitor and the cluster of the user's procedures.

The connection between the technological system at Zahony's border region and the VT 20/20 is shown in Figure 2.

The Control

The real-time clock of the VT 20/20 CPU controls the pace of the 12 programs that run simultaneously. The amount of the time period given for the individual programs is dynamically changed according to the existing situation. This makes it possible to use the CPU as a source of power most efficiently. The operation of the periphery is put on a logical level by the monitor toward the user's level. The periphery handlers connected with the disconnecting system operate into the buffer area and in certain cases--when the time parameters of the processing make it necessary--direct connection can be made between the disconnecting system and the programs.

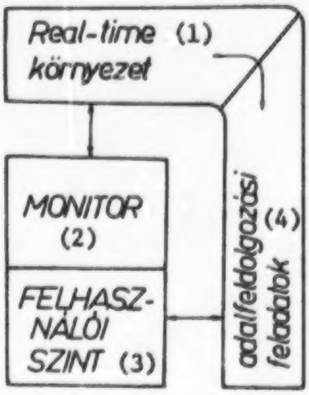

Real-time (1)
környezet
MONITOR
(2)
FELHASZ-
NÁLÓI
SZINT (3)
adatfeldolgozási
feladatok
(4)

Figure 2

Key:

1. Real-time environment
2. Monitor
3. Level of use
4. Data-processing tasks

The governing monitor also guides the background storage toward a higher level and handles the libraries of the sequential and index-sequential stocks.

The system's input data are collected at each work unit, waiting to be controlled and forwarded as a temporary stock of the sequential library. Some of these data change the stock of the local data base according to the construction of the information system; obtaining local information on this data base is also possible. This is the point from which the given procedure of the user's level puts together the various registers and tables. (The structure of the governing monitor is shown in Figure 3.)

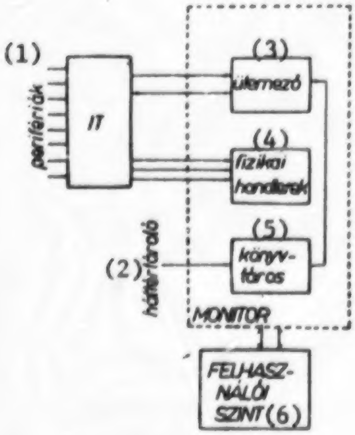

(1)
perifériák
IT
(3)
ütemező
(4)
fizikai
handlerek
(5)
könyv-
táros
(2)
háttértároló
MONITOR
FELHASZ-
NÁLÓI
SZINT(6)

Figure 3

Key:

1. Peripherals
2. Background storage
3. Pacer
4. Physical handlers
5. Librarian
6. Level of use

Pacing

The pacing system can distribute the CPU's power sources simultaneously between any number--12 at present--of active programs. From the aspect of pacing, a program may be either active or waiting. The time division between the active programs is done according to the so-called "round robin" algorhythm, and every pace has the same priority. The pacer reaches the programs through a "control block" that is in a table which also includes, in addition to the actual program characteristics, chain pointers regarding the table of the next active program. The programs' transitions from one to another state are done through disconnection from or connection to this chain. (Figure 4)

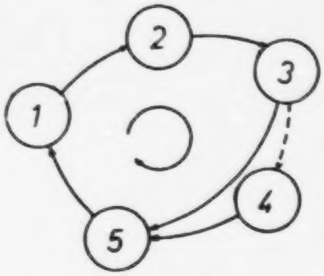


Figure 4

Those procedures which are taking place in the real-time environment, receive the command of activation or waiting directly from the periphery handlers. The answering time may be reduced this way. If a program is put in the state of waiting, another program waiting for a run can take its place. This strategy of pacing and the technique of chaining optimizes the pacer's administrative activity at full load.

Procedures of Use

Every procedure is connected to one or another well-separable function and may include several programs running simultaneously. As far as its construction is concerned, a procedure is made up of a leading program and possibly one or more serving programs. These serving programs, according to the need, separate from the main body into a separate time period. They may be storage residents or the elements of the program library. The difference between the two is in the frequency of use. (Figure 5)

What procedures are necessary on the user level? These are: receipt of data, control, change, storage arrangement and data forwarding.

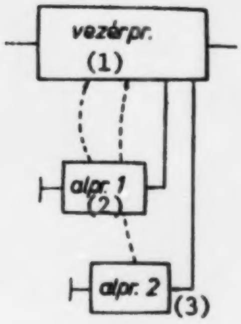


Figure 5

Key:
1. Leading program
2. Secondary program 1
3. Secondary program 2

The procedure for receiving data is related to the real-time environment and its task is to receive and put into background storage the data on cars, locomotives and loads resulting from train movements in the border region. This procedure has at least as many parallel programs as the number of work units that collect data simultaneously.

The control and changing procedure checks the completed records and, in case of a mistake, it requests a change and makes a statistical record of the mistake. The collection of data for transmission and the necessary filling of the data base is done by a separate procedure and, finally, the procedure doing the data transfer handles the data waiting to be forwarded and builds the incoming line for the procedure that does the storage and ordering. The data-transferring algorhythm is the IBM's multipoint BSC algorhythm.

The structure described above is not for itself; it must be put into some kind of human environment and thus the activization and stopping of the functions and the selection of the modus operandi of the individual work units must be taken care of.

The leading procedure that is supporting the function of the entire system is activated immediately after it is turned on and writes on the screens the selected operation of the individual work units. By selecting the suitable operation (data input, information, etc.), it directs the appropriate procedure to the given work unit which then will be connected to that module. At the end of each function, before the procedure ends, it reconnects the work unit with the leading procedure so that a new operation can be selected.

Goals and Plans

The primary objective of the development at the SZAMKI is to design a software system for the VT 20/20 microcomputer which uses the concept of the so-called "open-ended design." This will make it possible to do other kinds of operations of a similar size with a minimum change of structure affecting the user's level.

9414
CSO: 2502

CAPABILITIES OF ESZ MAGNETIC TAPE STORES, DRIVES

Budapest SZAMITASTECHNIKA in Hungarian Jun 80 p 4

[Report by Peter Keszthelyi]

[Text] The series of articles introducing the ESZR peripheries up to now dealt with the slow (multiplex) peripheries. We will now introduce the fast peripheries. Their basic characteristic is that they possess a high speed of data transfer (tens, or even 100 Kbytes per second) and are suitable for block data transfer, that is, a transfer of several bytes. Block data transfer is necessary, for if we start the mechanical movement in these peripheries, then the change of information must be continuous. In this case, the channel can accommodate only one periphery. The selector channel is capable of this.

The magnetic tape periphery is the computer's background storage, with a great capacity of data storage. The magnetic tape storages are suitable for information input, output and storage. The data are set on the magnetic tape parallel at each byte (parity bittel) and the setting happens in the way of NRZI (Non-Return-To-Zero-Inverse). The time to reach the data is relatively long. The tape units exchange information in the commands of "write," "read" and "read backwards." The magnetic tape equipment has, in accordance with information fixing, parallel writing and reading heads in one unit (head unit). At fast rewinding and tape threading, the head unit withdraws from the tape. The removable protecting ring on the spool prevents the unwanted rewriting of the tape.

The tape-moving mechanism is a sensitive part of magnetic tape storages; this is what makes it possible to wind the tape back and forth rapidly without "jerks." Buffers help to prevent tearing the tape in fast stops and starts. At the beginning, mechanical tape buffers were used; they are now vacuum governed and this reduces physical wear. The tape is generally driven by a one-roller mechanism powered by a DC motor with the aid of a power regulator. The tape's feeding system is under overpressure and this helps keep the dust out.

The tape units are connected to their governors through the so-called small interface. The governor maintains the connection with the selector channel. The small interface is also an ESZR standard, in accordance with ISO recommendations.

Many kinds of magnetic tape storages have been developed in the ESZR such as, for example, the ESZ 5002, 5003, 5004, 5010, 5012, 5014, 5016, 5017, 5019, 5021 and 5022. Of these, the ESZ 5002, 5003, 5004, 5014, 5021 and 5022 are not available in Hungary. The ESZ 5010 was the storage of the ESZ 1020 computer. Two models of the ESZ 5012 are known, the ESZ 5012 and the 5012-01. Both models are made in the USSR; the ESZ 5012-01 is an up-dated version of the ESZ 5012. The ESZ 5017 has three models, the ESZ 5017, 5017-01 and 5017-02. The latter two are made in the GDR under Soviet license. The Czechoslovak ESZ 5004 is the most up-to-date equipment. This is capable not only of NRZI but also of phase-coded setting. Tape threading is entirely automatic, as is the opening of the tape's protecting ring and thus the latter must not be removed before threading. The part of the magnetic tape storages that is most prone to mechanical malfunction is the vacuum buffer storage/regulator and the coupler connector. The technical data of the storages are shown in Table 1.

The task of the control equipment is to make the connection between the magnetic tape storages and the channel. Connection with the channel is maintained through the standard interface; the storages are connected through the small interface. The control equipment "connects" only one storage with the channel simultaneously. A maximum of eight storage units may be connected to one governor. The governor recodes the channel's commands into control codes understood by the tape units, and it maintains--and checks--the exchange of information between the channel and the storages. The governor is capable of controlling storages even in off-the-line plants and thus repairs do not disturb the central unit.

Several kinds of magnetic tape governors have been developed in the ESZR: the ESZ 5503, 5511, 5512, 5514, 5515, 5516, 5517 and 5521 code numbers. Of these, only the ESZ 5503, 5514 and 5516 are not available in Hungary. The ESZ 5503 is the governor for the ESZ 5002, 5003 and 5004 storages which also employ phase-coded setting. The most frequent mechanical malfunctions are breakdowns of the integrated circuit and the connector. The technical data of the governors are shown in Table 2.

Table 1

Type	ESZ 5010	ESZ 5012 5012-01	ESZ 5016	ESZ 5017 5017-02	ESZ 5019	ESZ 5022
Access time (sec)	75	75	250	75	X	X
Tape speed (mps)	2	2	1.524	2	3	2
Signal density (bit per mm)	8 or 32	8 or 32	32	8 or 32	8,22,32	NRZI: 32 Phase coded: 63
Setting method	NRZI	NRZI	NRZI	NRZI	NRZI	NRZI or phase coded
No. of channels	9	9	9	9	9	9
Transfer speed (Kbyte per sec)	64	64	48	64	120	NRZI: 64 Phase coded: 126
Stopping speed (sec)	25-30	12.6-15.7	12.7-15.2	12.7-19.2	15.2	min.12.7
Block gap (mm)	6	X	5	5	X	2
Acceleration time (sec)	6	X	5	5	X	3
Tape size						
—length (m)	732	750	750	750	750	732
--width (mm)	12.7	12.7	12.7	12.7	12.7	12.7
Max. outer spool diameter (mm)	267	296	296	296	296	267
Checking			by the governor			
Two-direction reading	x	x	x	x	x	x
Governor model	ESZ 5511	ESZ 5517	ESZ 5516 5521	ESZ 5511 5517	ESZ 5517 5519	ESZ 5503
Made in	USSR	BDR	GDR	(a) USSR (b) GDR	PDR	CSSR

Note: X = Unknown

Table 2

Type	ESZ 5511	ESZ 5512	ESZ 5516	ESZ 5517	ESZ 5521	ESZ 5503
Method of connection with channel	standard I/O interface					
No. of parallel functions	1	1	1	1	1	1
	(the other storages in the meantime do the functions of "respooling" or "respooling and tape change")					
Connectable storages						
--number (each)	8	8	8	8	8	8-16
--model	ESZ 5010 5012	ESZ 5012	ESZ 5016 5017 5021	ESZ 5010 5012-01 5017 5017-02 5019 5022	ESZ 5016	ESZ 5002 5003 5004
Possibility of mixed connections	x	x	x	x	x	x
Max. transfer speed (Kbyte per sec)	64	64	96	128	64	315
Made in	USSR	BDR	USSR	USSR	GDR	CSSR

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CSO: 2502

COMPUTER SITUATION FOR 1979 REPORTED

Warsaw WIADOMOSCI STATYSTYCZNE in Polish No 8, Aug 80 pp 32-35

[Article by Dr Jan Iszkowski of the Research and Development Center of the State Statistical Information System, Central Office of Statistics: "Computerized Information Centers in 1979"]

[Text] The annual study of computerized information centers treated the state of 1,896 centers at the end of 1979, or 5 percent more than at the close of 1978. After the exclusion of reports from centers employing up to 4 persons which had no computers, reports from 1,523 centers, employing a total of 56,098 workers in 1979, were studied.

Table 1. Computerized Information Centers and Employees

Specifications	1975	1976	1977	1978	1979
			In absolute figures		
Centers	1,031	1,252	1,365	1,468	1,523
Employees (in thousands)	40.4	46.2	50.5	55.5	56.1
			The previous year: 100		
Centers	136	121	109	108	104
Employees	115	114	109	110	101

Source: Data from the Research and Development Center [OBR] of the State Statistical Information System [SPIS]

These data indicate that in 1979 the growth rate of a number of centers underwent a significant reduction, with an increase in employment in particular being checked in these centers. This resulted in a reduction in the average size of a center, which employed 37.8 workers in 1978, and 36.8 workers in 1979. Table 2 represents the change in the structure of centers according to the classes of center size in existence from 1976-1979.

Table 2. The Number of Centers According to the Classes of Center Size

Classes of center size according to the number of employees	1976	1978	1979	1976	1978	1979
	in absolute figures			in percentages		
In general	1,252	1,468	1,523	100.0	100.0	100.0
Below 5	212	177	180	16.9	12.1	11.8
5- 10	319	471	475	25.5	32.1	31.2
11- 20	259	277	305	20.7	18.9	20.0
21- 50	240	273	283	19.2	18.6	18.6
51- 100	113	142	154	9.0	9.7	10.1
101- 200	67	74	76	5.3	5.0	5.0
201- 500	37	49	44	3.0	3.3	2.9
Over 500	5	5	6	0.4	0.3	0.4

Source: Data from OBR SPIS.

Shifts in the above-noted structure last year were minimal. The share of centers which are independent accounting units decreased insignificantly; it stands at 8.5 percent (in 1978 it was 8.6 percent). The share of centers which have no computers decreased from 3.5 percent to 3.4 percent. In a distribution according to ministries, a minor series of shifts occurred which Table 3 presents for the major ministries.

From shifts in the structure of centers according to their territorial distribution, we may infer an insignificant increase in the share of voivodships, in which computerized information centers are less developed.

The directions of activity reported by computerized information centers indicate that the multidirectionality of activities is being maintained. They also show that among the directions which have undergone the greatest expansion, in addition to data processing on computers and the use of computers for controlling production processes, is that of organizational counsel and the coordination of labors in the sphere of information science.

Table 3. The Share of Selected Ministries in the Total Number of Computerized Information Centers and the Totals of Employees in These Centers in 1979

Ministries	Share in the number of centers in %	Difference in % points from 1978	Share in the number of employees in %	Difference in % points from 1978
In general	100.0	x	100.0	x
including the ministries of:				
Machine Engineering Industry	16.8	-1.1	14.1	-0.2
Science, Higher Education and Technology	7.8	+0.1	15.3	0.0
Construction and Construction Materials Industry	7.6	+1.0	7.4	-0.3
Chemical Industry	7.4	0.0	4.5	0.0
Light Industry	7.4	+0.1	3.2	0.0
Heavy and Agricultural Machine Industry	7.0	-0.9	5.6	-0.8
Power Industry and Atomic Energy	5.9	+1.1	4.0	+0.9
Metallurgy	4.1	-0.1	4.5	-0.1
Food Industry and Purchases	3.8	-0.1	1.9	+0.1
Forestry and Timber Industry	3.7	-0.2	1.1	0.0
Agriculture	3.3	+0.1	1.6	+0.1
Transportation	3.3	+0.1	5.5	+0.2
Communications	3.2	-0.1	3.3	-0.1
Central Office of Statistics	2.6	-0.1	6.8	-0.4
Mining	2.5	-0.2	4.5	+0.1
Administration, Local Economy and Environmental Protection	2.1	0.0	2.5	+0.1
Foreign Trade and Maritime Economy	2.0	-0.1	1.4	0.0
Other Ministries	9.5	+0.2	12.8	+0.4

Source: Data from OBR SPIS.

Table 4. Share of Selected Voivodships in the Total Number of Computerized Information Centers and of Employees in Information Science in 1979.

Voivodships	Share in the number of centers in %	Difference in % points from 1978	Share in the number of employees in %	Difference in % points from 1978
In general	100.0	x	100.0	x
Warsaw--capital	19.7	-0.3	24.1	-0.3
Katowice	11.8	+0.2	13.8	-0.2
Lodz--municipal	7.3	-0.1	6.0	0.0
Poznan	5.9	0.0	5.0	-0.1
Krakow--city	5.7	-0.6	5.8	-0.1
Wroclaw	5.1	-0.1	7.1	+0.1
Gdansk	4.9	+0.4	5.5	+0.2
Bydgoszcz	3.3	-0.3	3.7	-0.1
Bielsko-Biala	2.6	0.0	1.8	+0.2
Opole	2.3	0.0	1.3	0.0
Lublin	2.0	0.0	2.0	+0.2
Other voivodships (38 voivodships)	29.4	+0.8	23.9	+0.1

Source: Data from OBR SPIS.

Table 5. Computerized Information Centers According to Kinds of Activity

Kind of activity	1977	1978	1979	1978= =100
	in absolute figures			
Centers in general	1,365	1,468	1,523	104
operating in the sphere of:				
Designing and programming computer systems	932	907	947	104
Designing and programming systems for perforated card machines	68	58	49	85
Processing data on computers	811	809	878	109
Processing data on perforated card machines	119	74	61	82
Creating carriers of information	1,114	1,158	1,206	104
Training cadres for information	141	172	182	106
Conducting research-developmental efforts	318	290	302	104
Organizational counsel	167	180	209	116
Coordinating efforts in the sphere of information science	355	407	486	119
Installation, maintenance and repair of computers	-	249	245	98
Using computers for controlling production processes	-	56	60	107

Source: Data from OBR SPIS.

Although deliveries of computers for domestic consumers in 1979 were generally lower by 2.4 percent than in 1978 (and 50 percent lower than in 1975), we have continued to note an increase in the average equipping of centers with computers. For every 100 centers the number of computers was:

92 -- in 1975
124 -- in 1976
138 -- in 1977
143 -- in 1978
150 -- in 1979

The following represents the picture with regard to the possession of computers by information centers:

Table 6. Computers in Information Centers

Computers	1975	1976	1977	1978	1979
	In				
In general	944	1,547	1,890	2,092	2,282
large and mid-size	514	623	708	756	812
minicomputers	430	924	1,182	1,336	1,470
	Previous year = 100				
In general		164	122	111	109
large and mid-size		121	113	107	107
minicomputers		215	128	113	110

Source: Data from OBR SPIS.

Table 7. Structure of the Computer Park by Age

		Computers by number of years old					
		1-3	4-5	6-8	9-10	11-15	over 15
Years	In general	in percentages					
Computers in general							
1977	100.0	57.1	27.5	9.3	3.6	1.7	0.8
1978	100.0	35.1	43.5	16.2	3.1	1.8	0.3
1979	100.0	26.2	41.0	26.6	3.3	2.5	0.2
Large and mid-sized computers							
1978	100.0	30.3	31.7	24.0	8.3	5.0	0.7
1979	100.0	21.6	29.8	32.1	9.0	6.9	0.6
Minicomputers							
1978	100.0	37.9	50.2	11.8	-	-	0.1
1979	100.0	28.8	47.3	23.7	0.2	-	-

Source: Data from OBR SPIS.

The growth of the state of computer possession was influenced primarily by an increase in the number of computers installed of the types:

Odra 1305	with 17 units
R-32	with 18 units
Mera 305	with 38 units
Mera 400	with 63 units

The relatively minor fall in the increase of the number of computers in 1979, by comparison to supplies of them, arose from the installation of a number of computers in that year which had been manufactured in former years, primarily in 1978; nonetheless this increase was, for example, more than 3-fold less that of 1976. The halt in the increase of the number of computers in information centers reflects unfavorably on the structure of the age of the computer park. The dominant class in this regard is the class 4-5 years old, and in the case of large and mid-size computers, the class 6-8 years old. As far as computers are concerned this is an old class.

The graph (Figure 1) which demonstrates the rapidly narrowing foundation of the "age pyramid" of computers, represents the structure of age still more clearly than the above table. This graph clearly delineates the picture of a fall in the number of computers, particularly large and mid-size computers, over several years, to the extent that supplies of machines are not essentially increased. Supplies at present do not guarantee--on a long-range scale--even the simple reproduction of the park of large and mid-size computers.

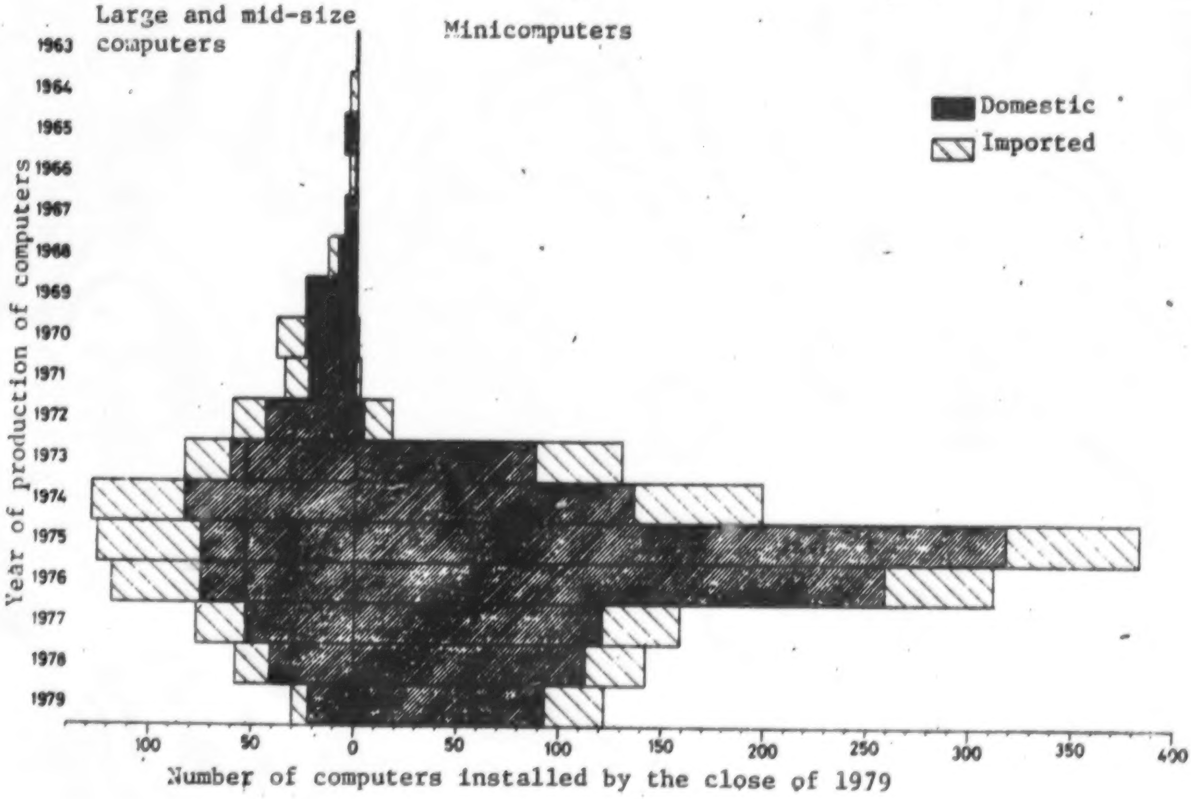

Figure 1. Age Structure of Computers in Information Centers

Changes in the structure of the size of the internal memory of computers, according to the classes of the capacity of this memory, primarily consist of an increase of the share of computers of class 257-512 kilobits and of class 8-64 kilobits. On the other hand, the share of computers with the largest and mid-size memories is decreasing. This is illustrated by Table 8.

Table 8. Computers according to Classes of Internal Memory Capacity

			According to classes of internal memory capacity in kilobits			
Specifications	Years	In general	8-64	65--256	257--512	over 512
Number of computers	1978	2,092	1,413	501	160	18
	1979	2,282	1,539	521	203	19
Structure (in percentages)	1978	100.0	67.5	23.9	7.7	0.9
	1979	100.0	67.4	22.8	9.0	0.8
Internal memory capacity in megabits	1978	177.5	25.6	66.1	57.9	27.9
	1979	189.9	31.6	69.5	73.3	15.5
Structure (in percentages)	1978	100.0	14.4	37.2	32.6	15.8
	1979	100.0	16.6	36.6	38.6	8.2

Source: Data from OBR SPIS.

The increase in devices for the preparation of machine data carriers (generally by 3 percent) is characterized by a very important increase in the number of multi-position registers and card punch-verifier units, as well as of bookkeeping and invoicing machines and the like.

Table 9. Equipping of Computers with Input, Output and Input-Output Devices (state at the close of the year)

	1978	1979	
Specifications	in absolute figures		1978=100
In general	9,693	10,506	108
Input devices	2,855	3,078	107
Readers	2,841	3,067	108
including: paper tape readers	1,806	1,932	107
Graphic input devices	14	11	79
Output devices	4,386	4,887	111
Perforators	1,839	1,995	109
including: paper tape perforators	1,557	1,657	106
Printers	2,072	2,470	119
including: line printers	1,992	2,396	120
Screen monitors	235	253	108
Graph plotters	88	106	121
Other	152	63	41
Input-Output devices	2,425	2,541	105
Readers-Perforators	353	370	105
including: readers of paper tape perforators	329	347	106
Teleprinters	352	305	87
Consoles	947	1,121	118
with a typewriter	687	781	114
with a monitor	260	340	131
Other	773	745	96

Source: Data from OBR SPIS.

Table 10. Devices for the Preparation of Machine Carriers in Information Centers in Units

Specifications	1977	1978	1979	1978=100
	in absolute figures			
In general	14,339	16,399	16,922	103
including:				
Uni-position registers	36	59	63	107
Multi-position registers	89	211	284	135
Card punches	6,487	6,892	6,833	99
Card verifiers	4,098	2,882	3,879	99
Card punch-verifier units	98	64	85	132
Card punches, verifiers and tape punch-verifier units	506	552	423	76
Bookkeeping, invoicing machines, automatic accounting and business machines	1,891	3,395	4,127	122
Automatic writing machines, teleprinters, flexowriters	877	964	930	96
Punch-adders	205	308	224	73

Source: Data from OBR SPIS

The number of devices for the teletransmission of data in information centers has increased significantly.

The number of input devices, output devices and input-output devices has increased by approximately 8 percent, which roughly corresponds to the growth in the number of computers. The growth of the state of possession of line printers, graph plotters and consoles with monitors is worthy of mention.

Table 11. Devices of the Teletransmission of Data in Information Centers

Specifications	1977	1978	1979	1978=100
	in absolute figures			
In general	1,605	2,413	3,127	130
Intelligent terminals	33	44	56	127
Non-intelligent terminals	840	1,161	1,224	105
including dialogue terminals	495	905	852	94
Devices controlling the transmission of data	121	225	347	154
Convertors of binary signals	611	983	1,500	153

Source: Data from OBR SPIS.

At the same time the number of intelligent terminals, devices controlling data transmission and convertors of binary signals in existence increased in particular.

Indexes of the use of work time of computers in 1979 essentially remained at 1978 levels. A slight improvement in the utilization of large and mid-size computers was noted (from 13.1 hours to 13.3 operating hours per work day) and an insignificant reduction in the use of minicomputers was noted (from 6.5 to 6.4 operating hours per work day). These results would certainly be more favorable, were it not for numerous interrupts in operation and an increased failure rate which occurred during the first quarter of the year in particular due to numerous current shutoffs. Among the causes of stoppages, stoppages resulting from organizational causes were of somewhat less significance than in 1978 (their share was reduced from 12.3 percent in 1978 to 10.9 percent), with stoppages for technical reasons being of greater significance (an increase from 12.3 percent to 12.5 percent). These changes are appreciable particularly in the case of minicomputers and imported computers. The operating shift rate, however, which according to estimates averaged 1.5 shifts (with 1.9 for large and mid-size computers and 1.2 for minicomputers) has a basic influence on the use of operating time during the course of the day. The operating shift rate in turn depends not only on the imposition of instructions but also on the employment possibilities of workers. The highest operating shift rate of large and mid-size computers occurs in the centers of: the Association for Information Science (2.7), the Ministry of Construction and the Construction Materials Industry (2.5), the Ministry of Mining and the Ministry of Transportation (2.3), the Central Office of Statistics and the Ministry of Metallurgy (2.2), the Ministry of the Chemical Industry (2.1) and the Ministry of Communications (2.0). Minicomputers, on the other hand, are used for more than 2 shifts (2.2 shifts) only in the Ministry of Mining and Ministry of Metallurgy.

The structure of the use of operating time of computers evidences the greatest share of usage in controlling production processes, while in management it is used extensively for financial settlements and materials management. Changes in this structure are fairly slow to occur.

Table 12. The Structure of Operating Time of Computers according to Kinds of Matters for Processing

Matters for processing	1977	1978	1979
	in percentages		
In general	100.0	100.0	100.0
Controlling production processes	16.4	17.0	18.1
Design labors, engineering and scientific calculation	16.5	19.4	17.6
Management	67.1	63.6	64.3
including the following systems:			
multi-range	3.2	2.8	3.2
the technical preparation of production, planning and control of the execution of production plans	9.5	8.7	8.3
materials management	14.7	12.9	12.7
goods management	4.7	5.2	5.1
management of fixed assets	2.3	1.8	1.8
financial settlements	10.3	13.0	13.8
cadre management	6.2	5.1	4.8
statistics and statistical analysis	8.6	7.0	7.2

Source: Data from OBR SPIS.

The value and the sale of computerized information increased in 1979 at a significantly slower rate than in the years 1978 and 1977, while, unlike in 1978, costs of the execution of labors and services increased more than the value of the sale of services.

Table 13. The Value of Labors and Services, the Value of Sale and the Costs of the Execution of Labors and Services of Information Centers

Specifications	1976	1977	1978	1979
In billions of zloty				
Value of labors and services	7.9	10.2	12.6	13.8
Sale of services	4.2	5.3	7.0	7.5
Costs of the execution of labors and services	6.8	8.9	11.2	12.3
The previous year = 100				
Value of labors and services	-	128	123	110
Sale of services	-	126	134	106
Costs of the execution of labors and services	-	131	125	110

Source: Data from OBR SPIS.

The continued systematic growth of the share of materials costs is noted, particularly with regard to the costs of depreciation and the costs of operating materials.

Table 14. The Structure of Costs of the Execution of Labors and Services of Information Centers

Groups of costs	1976	1977	1978	1979
	in percentages			
Costs of execution				
In general	100.0	100.0	100.0	100.0
Non-materials costs	45.2	42.0	39.1	38.7
including the wage fund	30.8	29.2	27.5	27.3
Material costs	54.8	58.0	60.9	61.3
including: foreign services	15.7	15.4	16.2	15.7
depreciation	22.2	26.6	28.9	29.9
operating materials	9.1	8.7	9.0	9.1

Source: Data from OBR SPIS.

These latter costs are increasing, despite the fact that, for example, the supplies of paper materials in the past year decreased by nearly 1 percent, which with regard to the continued increase in the production potential of information centers creates serious difficulties.

Table 15. Turnover of Employees in Information Centers

Groups of employees	1975	1977	1978	1979	1975	1977	1978	1979
	hiring factor				dismissal factor			
In general	30.7	22.9	20.0	19.5	19.4	16.4	15.8	18.9
including:								
Analysts and systems designers	26.9	17.0	11.7	12.0	17.5	13.4	10.9	14.1
Programmers	33.0	24.0	18.8	17.0	18.1	16.4	14.6	16.9
Operators	35.4	27.2	25.9	26.7	21.3	19.4	20.0	24.4
Maintenance personnel	32.8	22.7	18.4	17.4	16.7	14.3	14.3	15.7

Source: Data from OBR SPIS.

In 1979 a growing instability of personnel was noted by comparison with former years. To the extent that on the one hand hiring factors decreased (which is the natural result of the checking of the growth of employment), to that same extent the increase of dismissal factors occurring in all fundamental groups of employees is disturbing. These data are represented in Table 15.

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JPRS 76668

21 October 1980

East Europe Report

SCIENTIFIC AFFAIRS

No. 685

FBIS FOREIGN BROADCAST INFORMATION SERVICE

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JPRS 76668

21 October 1980

EAST EUROPE REPORT

SCIENTIFIC AFFAIRS

No. 685

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BULGARIA

SCIENTIST CLAIMS THAT RESEARCH IN GENETICS IS FALLING BEHIND

Sofia LITERATUREN FRONT in Bulgarian 21 Aug 80 pp 1-2

[Interview with Academician Rumen Tsanev by Vera Stefanova: "The Optimist"]

[Text]

I do not recall what precisely impressed me the most when I found out that the son of the noted literary expert Academician Georgi Tsanev had become an academician himself. Perhaps it was the fact that Rumen, the youngster who grew up in those years of transition, who was always present in all the meetings of progressive writers in his father's home and who retained throughout his life not only vivid impressions but a love for literature, subsequently chose the field of the natural sciences. Today as well Academician Rumen Tsanev emotionally recalls as one of the most important events in his life the time when our noted geneticist Doncho Kostov, back from the Soviet Union, set up a new scientific unit under the BAN [Bulgarian Academy of Sciences] and took him as his assistant. I had not heard such an admission before meeting the younger Tsanev--the fact that if he could trade his academic title for very good working conditions he would do so immediately!

Naively, he may have considered another sincerely shared concern, not a concern for his own problems, for his road to the academic title, according to him, was clear and smooth. It was a concern for the future of science in whose area he has worked from its very beginning. He was concerned that we can no longer "pursue universal levels, and that this is a real tragedy to us, for our hands are tied. Abroad science is making great progress and the distance is growing steadily whereas we, because of lack of funds and the necessary equipment, are falling behind!

"However, I am naturally an optimist! I believe and I wait!" He was sincere, knowing that "in science there is no wide, gradual way...," and that one must climb steep paths...!

"Academician Tsanev, it seems to me that you are the only case in our country of father and son being academicians?"

"Yes. However, we are in different fields. Therefore, I have not inherited from my father...."

"Could you describe the results of your scientific activities and translate them into the language of the uneducated reader?"

"This would mean to describe to you my work. I am working in the field of molecular biology which studies chemical compounds and processes in living organisms which determine the phenomenon of life. It means that I am dealing with the nature of life, more particularly, the structure of the genetic apparatus, of the cellular structures which determine the hereditary characteristics of organisms. It is they that determine the behavior and characteristics of each organism. The determination of the molecular organization of such structures and their modus operandi is of particular importance in the struggle against some diseases, cancer in particular. The appearance of cancerous cells is due precisely to a disturbance of the structure of the cellular genetic apparatus. Therefore, this is a problem which is basic, which affects the essence of life, and is of exceptional importance to society. This is particularly the case today, when as a result of the development of molecular biology gene engineering has appeared."

"Please, could you give us a few more details on this new direction in your science. What are its possibilities?"

"Gene engineering makes it possible to isolate individual genes, to manipulate them, to transfer them from one organism to another, and to create an organism with a heredity which is a combination of different organisms. This is a very great success of molecular biology and the result not only of a single discovery but of a number of individual basic discoveries in the field of molecular biology. Gene engineering will make it possible to develop new industries and create new pharmaceuticals which would have been inconceivable in the past. Some human hormones have already been obtained this way. Quite recently gene engineering was able to synthesize a protein--interferon--which can protect man from catching a cold. It has been reported that it could be used in the treatment of some forms of cancer as well...."

"If all these are problems related to your area, does this mean that you are in the leading front of the science of biology?"

"Yes. Molecular biology is a strategic direction in biology, for discoveries in this science determine the solution of vitally important problems to mankind. On the one hand, in the field of medicine, this involves the struggle against viral diseases and malignant tumors, surmounting tissue incompatibilities in successful organ transplants, and so on. On the other hand, in agriculture, this means developing new species, improving others, and creating new microorganisms which could clean the environment...."

"What about the strategic significance of your science?"

"Our discoveries may present a danger from the military viewpoint as well, for they offer the possibility for the creation of new microorganisms and strains which could be used for military purposes. My view is that this area is exceptionally, vitally important to any society and that it should be the subject of prime attention...."

"To the best of my knowledge, major arguments are underway on the interference of science in hereditary 'material.' Is this interference ethical?"

"In our science it is a question precisely of human interference in heredity and the creation of new organisms. Now, for example, new organisms have been developed containing human genetic material. I would not like to issue an opinion as to the ethical nature of such matters. I believe, however, that anything which serves man is ethical. In the final account, if everything benefits mankind the way covered by the scientists should not be taken into consideration as long as it has not harmed the people...!"

"What happenstances and errors did you experience before reaching your discovery number one?"

"I'm still hoping that I have not reached discovery number one, and that I am as yet to make it. In any work, naturally, even in the most insignificant, man does not come to the truth directly and immediately. The truth is not always reached smoothly. Occasionally, however, even an error could contribute to the development of science...."

"Nevertheless, is the distance from an error to a discovery long?"

"It may be long and it may be short. It depends on the case. We know from history that some scientists spent decades in work while others were lucky to achieve faster results. There is no rule. It is well known that discoveries may be accidental as well. However, they come to the trained mind only...."

"In one sentence, tell us about your best accomplishment."

"I think that it is related to some problems of molecular mechanisms controlling the development of organisms...."

"What other things have not as yet been entirely explained in your scientific area? What are your latest hypotheses?"

A number of things have not been explained. It is only now, in recent years, that molecular biology has brought to light the mechanisms of the hereditary apparatus of the cell. The latest hypotheses of our collective apply to mechanisms through which gene activities are controlled. In this area very few things have been explained, particularly in the case of higher organisms."

"It has been repeatedly confirmed that the most important discoveries are being made through the synthesis of various fields of knowledge...."

"I agree. Molecular biology itself is, precisely, a combination of chemistry, physics, mathematics and biology. No one could work successfully in this area without a knowledge of the four subjects. This is the area in which these different sciences crisscross and, actually, this is what leads to the greatest discoveries...."

"Could you be more specific?"

"Take my successful work with Corresponding Member Professor Blagovest Sendov, for example. We made one of the first experiments in the mathematical modeling of cellular activities. This yielded interesting results for future experimental tests. We reached an important hypothesis on which we are working to this day. It is a question of the fact that the cell contains not only genetic information but other types of information which is not coded in the DNA and which determines the program for development of the organisms. According to some, the entire development information is found within the DNA. Our experiments, however, have led us to the idea that this is probably not the case. It is precisely on this epigenetic information that the experimental studies of our collective are focused. This is the usefulness of the crossing, the synthesizing of two sciences--biology and mathematics. In recent years this hypothesis has been adopted by a number of foreign scientists. Of late we have obtained experimental data in its favor...."

"It is known that science requires total dedication. How do you block the temptations of life?"

"I believe that science and scientific creativity are also a temptation, a rather strong one...!"

"Nevertheless, does this temptation exclude purely human temptations?"

"No, it does not. However, when it is very strong it imposes, in fact, a rhythm which takes over the individual from dawn to dusk, involving all efforts, so that the person does not have to protect himself...!"

"Some of your colleagues describe this as qualitative dedication."

"I do not agree, for in the final account, the person does this for his own satisfaction. Objectively, this is to the benefit of mankind so that, it turns out, the scientist dedicates himself to his respective science. Actually, he is satisfying his own, his scientific research interests...."

"You may have heard that the Soviet academician Kapitsa has won wittiness contests. To those unfamiliar with science this seems somewhat strange. That is why this is not an idle question: What is your attitude concerning humor? Do you like witty people?"

"Yes, I like humor. I like witty people very much. At the institute we greatly value those who have a feeling for humor. This you can see the moment you enter my office. Actually, have you read the text on the door: 'Take care of your boss, for the one who follows him may be worse!'"

"This text, it seems to me, was in English! It must be quite difficult for the candidates who enter your institute. Could it be that you are subjecting them to a competitive examination...in wittiness as well?"

"...Wit is something which, in my view, characterizes every serious person. A person who does not understand humor is not serious...."

"Yet, witty people are frequently sarcastic as well."

"Well, why not, if they have grounds to be biting...."

"How would you refute the claim that within each person there is another person?"

"I would not. In me too there lives yet another person or maybe two people. I have in me the person who loves literature and art, who engages in translations, and who frequently wastes time to practice his hobby. Since childhood I have dreamed of travel and adventures in strange countries. Naturally, this has been entirely suppressed. Furthermore, my wife says quite frequently that there is also a militiaman within me--that I always interfere with everything, and that I want to bring order to everything. So, here are several people living inside me...."

"You said that you love fiction and art. Do you feel the need for being always in touch with them?"

"Yes. Since childhood I have lived in such an environment and it is natural for me to love fiction, poetry in particular. I also confess to the 'sin' of translating, mainly Mayakovskiy. I translated one of his difficult poems before they were translated in our country. To this day I like to translate...."

"Under a pseudonym?"

"A pseudonym is a pseudonym precisely so that the author may remain unidentified. I translate for my own pleasure."

"What are the features of the contemporary, of this efficient 20th century, which you reject?"

"I cannot stand parasites. There are people in scientific institutes who, by virtue of their social position, use the work of others. I do have specific examples!"

"In your view, is this a phenomenon or an isolated case?"

"In my view, it is a phenomenon! I do not like arrogant or impudent people as well...!"

"Which of the major problems of today concern you the most?"

"The problem of peace above all! And of the possibility for the people to manifest their creativity, to live a free and creative life. This requires peace and a corresponding social environment. I am sure that this is problem number one for all people...!"

5003
CSO: 2202

STEPS TOWARD DEVELOPMENT OF ROBOTS DESCRIBED

Robot Developers

Sofia RABOTNICHESKO DELO in Bulgarian 1 Sep 80 p 4

[Article by Ivan Gerov, director of the Kazanluk Institute for Hydraulics and Pneumatics: "The Developers of Robots"]

[Text] In the struggle to increase production efficiency, ever-higher demands are being made on the development of hydraulics.

For more than a half century, hydraulic systems have proven their necessity and are required ever more certainly as a new, advanced technical system for accelerating the development of automation. Both at present and in the future these systems will have a decisive impact on the scientific and technical level of all modern machines and equipment and on entire production lines and automated plants.

In recent years, the Kazanluk Institute for Hydraulics and Pneumatics has been working in several basic areas related to the development of new and improved hydraulic systems and elements. The first of them encompasses the preparation of systems for industrial robots and manipulators, and this includes 20 group problems related mainly to the control and regulation of robots. The science associates and specialists at the institute are making an effort to improve the elements which increase the reliability of the production of battery-operated and internal combustion engine plant trucks, and this is another basic area in the institute's activities. The solving of the problems in this area includes the development of new types of cog pumps, pressure distributor valves and scores of other parts. As a third area in the institute's work we must also mention the increased range of hydraulic parts for exports to the Soviet Union. The wider use of hydraulic parts in mining equipment is also a basic area in which many results have been achieved.

At present it is impossible to carry out the intellectualization of production without the mass application and use of hydraulic elements and systems in every sort of machine and equipment. By combining the positive qualities of hydraulics with those of electrical engineering and electronics, it is possible to realize optimum systems for movement, control, regulation and inspection.

The applicability of hydraulic and pneumatic systems and elements is growing annually. The average annual production rate for the industrially developed countries is 12-14 percent, and in certain countries as Japan, it has reached up to 25 percent. The ratio for the production of hydraulic systems to pneumatic ones is 3.5:1, and this shows the priority of hydraulics.

There are numerous examples of a multiple increase in the productivity of machines and equipment by the use of hydraulics in them. Thus an ordinary tractor with a mounted hydraulic system for beet thinning in 8 hours frees 52 persons. Here the hydraulic beet thinner is much lighter, some 30 percent in comparison with mechanical motion. Hydraulic metal cutting machines raised productivity from 30 to 50 percent, and for some even by 2-3-fold. Hydraulic excavators are 30 percent more productive and 12 percent lighter than those with purely mechanical propulsion. An automatic production line for pallets equipped with pneumatic robots requires 10-fold fewer man-hours than one with mechanical equipment, and so forth.

These and many other examples affirm that it would be impossible to carry out full mechanization and automation in most production processes without the accelerated development of hydraluics and pneumatics.

Development Trends

Sofia RABOTNICHESKO DELO in Bulgarian 1 Sep 80 p 4

[Article by Docent and Candidate of Technical Sciences Mikhail Komitovski of the Sofia V. I. Lenin Higher Mechanical Engineering Institute: "Development Trends"]

[Text] The requirements of scientific and technical progress as regards the automation of production processes and the increase in the productivity of machinery and equipment have brought about the exceptionally rapid development of hydraulic products. Indicative of this is the fact that in a number of developed countries of the world, the production of hydraulic drive elements and systems has been growing at a rate which outstrips the rate of other industrial sectors.

In our country the production volume of hydraulic elements has also been growing dynamically. Generally speaking, the hydraulic drive elements and systems at present have achieved a high technical level. They continue to be improved, and they compete with electric drive systems under the effect predominantly of diverse technical and economic factors such as the lower expenditure of labor and materials in producing them, improved speed and increased reliability. Another group of factors contributing to their development is closely tied to their use in new areas of industry such as robot production, heavy machine building, and so forth.

The high technical level of hydraulic drive systems to a great degree also determines the level of the end product, the machine or equipment. The development of production in areas in which our country has specialized within CEMA and has assumed leading positions such as the production of battery-operated and internal combustion engine plant trucks and manipulators, as well as the demands of developing heavy and investment machine building, have posed the task of setting up and organizing the production of new types of hydraulic elements and systems.

One of the trends which can be observed for many years now is the broad use of pumps with adjustable output and power as this provides a savings of energy.

The production of electrically controlled hydraulic elements is the following important development trend. With automatic or process-controlling devices of machines and equipment, the control signals, with few exceptions, are electronic or electric. In these instances, it is essential for the hydraulic elements to regulate the output, the direction of the flow, pressure and other variables in the system proportionately to the electric signal. This is achieved by employing servovalves, proportional distributors and output pressure valves.

The third trend in the development of hydraulic products is the creation of hydraulic systems with two-way valves for block assembly. Comparative analysis shows that with these systems there is a 2-fold reduction in the weight of the equipment, smaller losses of energy, with an increase in the service life, reliability and drive speed.

Without examining the remaining areas of hydraulic products, we would point out that the raising of the technical level of machine building is closely tied to the centralized production of complete hydraulic systems. This raises not only the quality of the products, but also creates an opportunity for rationally determining the production range and more rapidly introducing new and more advanced hydraulic systems into use. Their production must be viewed as a multiplier effect from building them into complete machines and equipment. In this sense, from the national economic viewpoint, in certain instances it is essential and advisable to produce elements in small runs or with a lower production efficiency, and this runs contrary to the economic interests of the producer of these elements.

10272
CSO: 2202

DEPUTY MINISTER DESCRIBES ATOMIC POWER STATION

Sofia ENERGETIKA in Bulgarian No 7, 1980 pp 9-15

[Article by Engineer Oved Tadzher, deputy minister of power supply: "The Kozloduy Nuclear Power Complex--Scales and Development Prospects"]

[Text] The commissioning of the first reactor of the Kozloduy Nuclear Power Plant marked the beginning of a new stage in the development of our power industry. Within record-setting time two blocks with a generating capacity of 440 megawatts each were installed. Today the nuclear power plant accounts for 20-22 percent of the country's electric power. In terms of this indicator--the share of nuclear power in the energy balance--today Bulgaria is in third place in the world.

By 1985 the Kozloduy AETs [Nuclear Power Plant] will have a generating capacity of 2,760 megawatts, which will be 28 percent of the maximum peak load of the energy system, and 32 percent of the country's electric power output. By 1987 these figures will rise, respectively, to 36 and 39 percent.

Such concentration of capacity, unheard of in terms of our scale, determines the comprehensive approach which must be applied in the development of the plant. The Kozloduy AETs must be fully supplied with everything necessary for normal operations--highly skilled cadres, repair capabilities, buffer warehouses of various kinds, construction and installation capacities, living amenities, and others.

The program for the development of the national energy complex stipulates that by 1990 atomic power in the power industry must reach 5,760 megawatts. The third and fourth blocks of the Kozloduy AETs will be commissioned in 1980-1981, thus raising its overall capacity to 1,760 megawatts.

The subsequent blocks will involve new generation reactors developing a capacity of 1,000 megawatts each.

Detailed studies were made by the Energoproekt NIPPIES [Scientific Research Planning and Design Institute for Power Systems] and the

Ministry of Power Supply on the location of the new VVER-1,000 reactors both on the site of the Kozloduy AETs and on other sites. Consultations with Soviet organizations were held as well.

The possibility to concentrate a capacity of 3,760 megawatts on a single site was considered in detail. The results of the studies and comparative data for other countries have confirmed the expediency of building two blocks with an overall capacity of 2,000 megawatts on the site of the Kozloduy AETs.

In the USSR, for example, sites for a 4,000 megawatt capacity are being selected, with a possibility to raise it to 6,000 megawatts. They include the Smolensk, Chernobyl', Khmel'nik, and other sites. Nuclear power plants on sites with capacities similar to ours have been built in Japan, the United States, the GDR, France, the FRG, Canada, and elsewhere.

Insuring the normal operation of the four blocks of the VVER-440 blocks and the two new blocks generating 1,000 megawatts each called for the adoption of a number of new qualitatively different designs. This is also related to the closeness of the suggested site for a second nuclear power plant and the convenient transport route of the Danube River.

The development of the Kozloduy Nuclear Power Complex was based on an order of the Council of Ministers. The complex will be a powerful base for our power industry whose role and significance are determined by the basic strategic direction followed by the party's energy policy of accelerated development of an atomic power industry.

The nuclear power complex (AEK) developed gradually and systematically, in accordance with requirements governing operations and construction, and cadres and their training.

It could be said today that its scale has been defined. It will have an overall generating capacity for 3,760 megawatts (4 x 440 + 2 x 1,000), covering installations for the transportation of the spent fuel, processing shops and warehouses for the storage of a variety of radioactive waste, repair capacities, and a powerful construction and installation base (Fig. 2). Delivering and training conditions of cadres within the complex will be based on the latest requirements.

The development of the complex covers the following stages:

Kozlodouy AETs-first stage-2 x 440 megawatts

The project was completed in 1975 with the commissioning of the second 440 megawatt reactor. In the subsequent five-years the plant operated

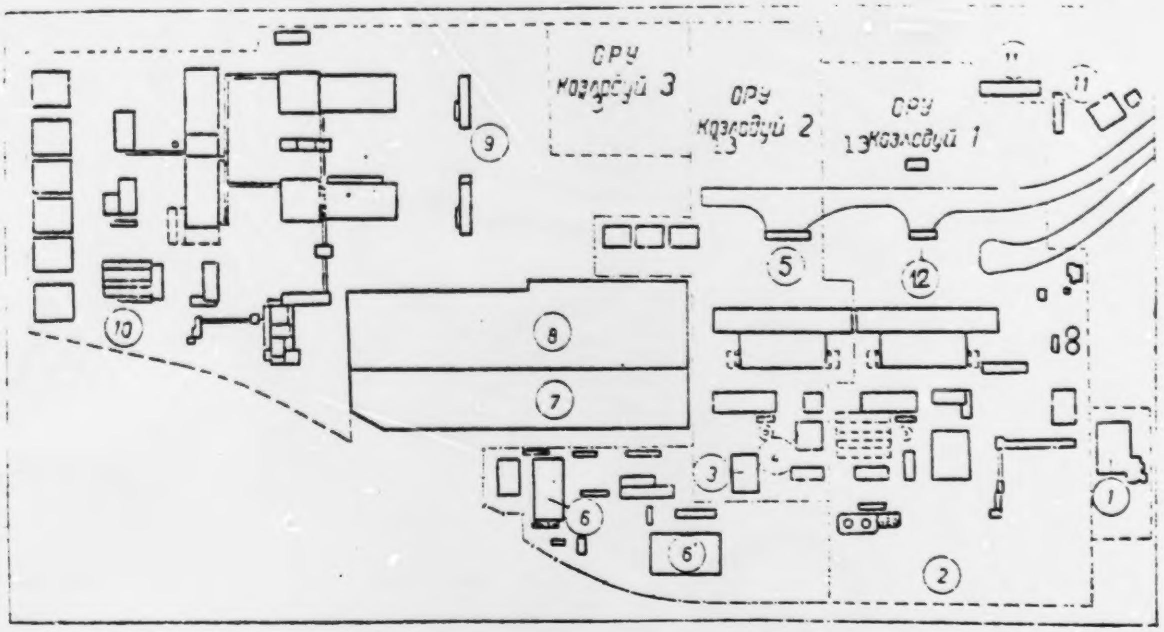


Fig. 1. Diagram of the Kozloduy Nuclear Power Complex

Key:
1. Training center
2. Nuclear electric power plant 1
3. Spent fuel storage
4. Workshop for the repair of installations in the first section
5. Nuclear power plant 2
6. Repair base (first stage)
6' Repair base (second stage)
7. Construction base
8. Installation base
9. Nuclear power plant 3 (2 x 1,000 megawatts)
10. Base of the Tekhenergo NPP [Scientific Production Enterprise]
11. Warehouse for soft polluted waste
12. Shore pumping station
13. Kozloduy ORU

in a stable and reliable manner. All planned indicators were outstripped in 1979 and over 6.1 billion kilowatt hours of electric power were generated.

Kozloduy AETs--second stage--2 x 440 megawatts

The two new blocks of the Kozloduy AETs, to be commissioned in 1980 and 1981, have an advanced design with additional systems which offer better support to the plant's work under different systems. Thus, for example, a more reliable solution has been provided to the systems for emergency injection of a boric acid solution, a sprinkler system, the feeding of steam generators, and others. Industrial water supplies have been considerably improved. Three separate systems have been planned for the major consumers of each block. A better technical solution has been found for the shore and circulation pumping station. The two shore pumping stations are connencted, which insures their operational maneuverability. The possibility of the flooding of shore pumping stations has been avoided, and so on.

More advanced solutions have been applied also in the electric power supply systems which will become more autonomous. Particular attention has been paid to the reliability of the system for emergency electric power supplies to first category consumers. The possibility of emergency stopping of the block and reducing its capacity with an emergency control panel has been stipulated.

Before the new blocks have been commissioned the bulk of the measures for raising the seismic resistance of the blocks will be carried out. They are contained in a special project designed by Soviet specialists and call for upgrading the seismic resistance of equipment and buildings for an earthquake rated as 7 on the Richter scale and a recurrence possibility of once every 10,000 years. The basic systems of the first section will be reinforced: the reactor building, the steam generators, the main circulation pumps, the actuating mechanisms, and others.

To this purpose special hydraulic shocks are being procured from Japan. The main steam pipes and other systems of the second part of the plant will be reinforced. A special system will be installed for industrial antiseismic protection which will switch off the generators should an earthquake reach a certain level. The existing battery system will be replaced by a seismically resistant one.

Later on, the main circulation pumps will be replaced by new inertial-type pums (with a flywheel).

All measures aimed at strengthening antiseismic protection will be also implemented later on at the operating blocks of the first stage of the Kozloduy AETs.

The Kozloduy AETs--third stage--2 x 1,000 megawatts

The third stage of the Kozloduy AETs will also have water-water type reactors developing an electric power generating capacity of 1,000 megawatts and saturated steam turbines with a unit power of 1000 MW, 3000 min^{-1}. The basic equipment will be procured from the USSR. Other parts will be delivered by the remaining CEMA-member countries as well, on the basis of an intergovernmental agreement. The plan for the Kozloduy 3 AETs is being drafted in a way which will make it possible to build and commission initially one block, followed by the second.

Industrial water supplies for the first 1,000 megawatt block will be provided through existing hydroengineering systems; the second block will require the building of a new water supply system from the Danube River. The two water supply systems will be connected. This will make the water supply system more flexible and more reliable.

The new reactors of the VVER-1,000 type (Fig. 2) represent a higher level in the development and perfecting of this type reactors. We know that water-water reactors are exceptionally reliable and stable and that their coefficient of use between recharging exceeds, in many of them, 0.90-0.95.

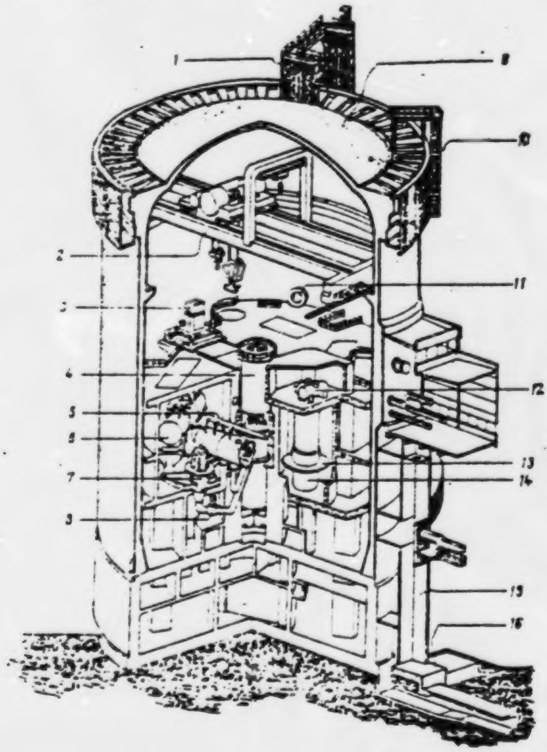


Fig. 2. Block with a 1,000 megawatt nuclear reactor

Key:
1. Roof exit
2. Bridge crane
3. Reloading machine
4. V-1,000 reactor
5. Steam mains
6. Steam generators
7. Main circulation pump
8. Main stopping valve
9. Reactor reinforced concrete cover
10. Upper manipulator
11. Emergency exit
12. Emulsifier
13. Service area
14. Volume compensator
15. Cable shaft
16. Pipeline passageway

The nuclear steam generating system will be located under a protective cover (dome) which will insure the radiation safety of the plant localizing their radioactive environment in the case of a breakdown cracking of the first section, accompanied by an increase in the internal pressure to 3.6 MRa and a temperature of up to 150°C. The dome will also serve as a protection from outside shocks such as a shockwave or a falling object.

The cover will consist of prestressed reinforced concrete with an internal steel lining based on a technology especially developed for the purpose by Soviet specialists. Under our circumstances this will require the organization of a new construction and installation base equipped with the necessary shops and machinery and proper crane mechanisms.

The designing of the construction and installation base was preceded by a detailed study of Soviet experience and consultations with respective Soviet organizations.

The annual gross electric power production will be about 7.5 billion kilowatt hours per block operating on a basic system of 7,000 effective hours. The reactor fuel will be uranium dioxide. Two variants--3.5 percent or 4.4 percent--had been planned, depending on the interval between recharging.

Spent Fuel Storage

In accordance with the recommendations of Soviet specialists, and on the basis of the territorial and geographic conditions of the Kozloduy AETs, the decision was made to build a storage for exhausted fuel on the plan's territory. Its purpose will be to receive, store, and ship out the cases with spent fuel. The design stipulates that all operations shall be in full accordance with technological requirements and radiation safety norms. The plant will have a special trailer truck for the transportation of the spent fuel. With the help of lifting equipment, the spent fuel will be taken from the truck to its allocated storage area. In the converse operation--the removal of the container--it shall be washed with special solutions and systems so that it may be deactivated to the level of the stipulated health norms.

The storage area will consist of individual and separate water-filled basins. The containers will be located at the bottom in other special containers. The storage area will have all the necessary systems for safety storing conditions.

Their capacity will be sufficient to take the containers from the four blocks of 440 megawatts each for a 10-year period. The problem of storing in the same area the containers from the 1,000 megawatt blocks is under study.

The design calls for the maximum utilization of existing installations and buildings for the preparation of deactivation solutions, water treatment, storing of radioactive waste, water supplies, steam supplies, sanitary living conditions, and others. The size of the personnel has been reduced to a minimum.

With the completion of the storage area for the spent fuel the power plant will become far better equipped and flexible in resolving problems related to spent fuel in various situations.

Installations for the Transportation of Spent Fuel

The shipping out of the spent fuel is a basic problem facing the power plant. In accordance with the intergovernmental agreement concluded between Bulgaria and the USSR, the spent fuel will be shipped to the USSR and processed in Soviet plants.

The transportation of the spent fuel is one of the most complex and difficult problems to resolve in the operation of nuclear power plants. That is why particular attention was paid to it. The plan for the transportation of spent fuel was developed by the Energoproekt NIPPIES with the active technical assistance of Soviet specialists. The necessary transport facilities for hauling the spent fuel have been secured and the hauling technology is fully in accordance with the stipulations of the International Atomic Energy Agency. Some of the fuel transportation cycles have already been successfully implemented. This is a major Bulgarian achievement.

The Tekhenergo NPP Base

The development and improvement of power production and distribution called for converting from the automation of individual production sectors to the creation of a unified interrelated automated system for the control of production processes.

Its implementation involves the saturation of technological processes with technical automated facilities and the utilization, along with mass-produced instruments, of a broad variety of specialized and one-of-a-kind apparatus based on the characteristics of the specific processes and installations. The various such apparatus have been produced either in small series or on a custom-made basis.

Studies have indicated that the need for specialized equipment in the sector is rising steadily and that by the end of the Eighth Five-Year Plan it will exceed 12 million leva per year. On the other hand, the ever stricter requirements for full metrological support of the production process call for the adoption of a new approach to the solution of the problem of automated technical facilities through centralized repair operations under industrial conditions.

So far, the Tekhenergo NPP has mastered the production of a certain variety of technical facilities with an annual output in excess of one million leva, including some 50 different types of items. The number of such items is being steadily expanded and developed in order to cover also installations which are currently being imported. In order to make such activities consistent with the increased requirements, in 1979 a branch of the Tekhenergo NPP was opened on the territory of the Kozloduy AETs. Its production program includes the making of specialized equipment for the needs of the sector and for spare parts, as well as centralized repair of technical means for the control and management of technological processes.

The subsequent development of this branch as a sectorial plant with an annual output scheduled to exceed five million leva by 1985, employing about 400 people, will make it possible to successfully resolve several other problems such as:

Sets of apparatus for the control and automation of newly built, reconstructed, or modernized projects in the power system through cooperation and integration with CEMA-member countries and with domestic plants;

Acceleration of the pace of automation of the energy system through electronics, robotics, and the application of other achievements of technical progress;

Fuller employment of women in the area of the Kozloduy Nuclear Power Complex.

At the end of this development the plant will encompass all engineering activities related to automation in the power industry.

Base for Equipment Repairs at the Kozloduy AETs

The high concentration of capacities at the Kozloduy AETs calls for the creation of a corresponding repair base. The 440 megawatt blocks will have two 220 megawatt turbines each. Every year each block will be recharged with fuel. The recharging takes 35 to 40 days. Meanwhile, the remaining power systems in unserviced premises and in the general part of the block will be repaired. Every year capital repairs will be made on one of the turbines and limited repairs to the second.

The capital repairs of the turbine will take 65 to 70 days. Therefore, the time for the reloading and repair of the four blocks will be 150 days, while that of basic repairs of the turbines will be about 260 to 280 days. Subsequently the time of repair operations of the 1,000 megawatt blocks will be added.

A large number of various installations will be concentrated in the Kozloduy AEK: turbines, pumps, transformers, generators, electrical equipment, a large number of control-measuring apparatus, and others. The cost of such installation will be about one billion leva. This will require the annual production of spare parts worth 30 million leva. This is the base of the development of repair capacities on the site of the Kozloduy AEK.

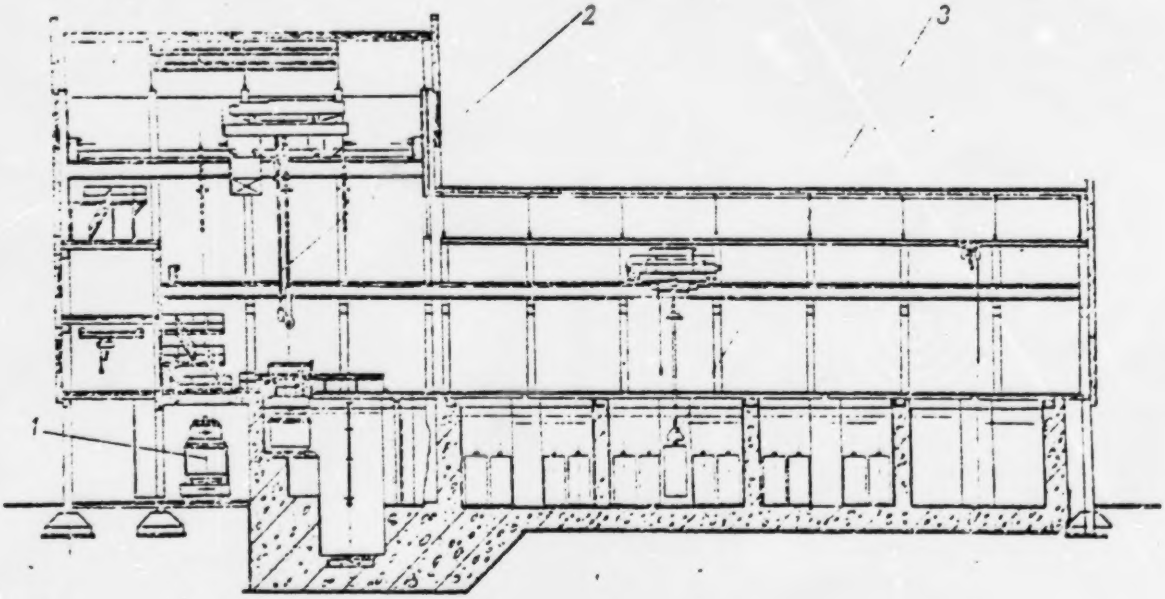


Fig. 3. Spent Fuel Storage

Key:
1. Spent fuel container
2. Valve and lever with special clamp
3. Special shielding container for the containers with spent fuel (slipper).

Fig. 1 shows the Kozloduy AEK repair shops. Several basic considerations governed the positioning of repair capacities, such as:

Insuring the most effective utilization of the manpower. This means, for example, the use of the entire repair personnel in periods of major labor-intensive repairs at the plant and the transfer of some personnel to the repair base in slack periods;

The possibility and expediency of using a number of common installations and engineering facilities such as roads, water and sewer mains, steam pipes, communications systems, production cooperation facilities, and others, thus saving consideral capital investments;

Better possibilities for the organizational coordination of repair operations;

Utilization of some buildings and installations of the construction base which will become unnecessary after the future expansion of the Kozloduy AEK.

The designing and construction of a base for the production of spare parts, attachments, and equipment for the Kozloduy AETs was undertaken by Decision No 631 of the Council of Ministers, dated 29 October 1974.

The first stage of the Kozloduy BREO [Spare Parts Production Base] was commissioned in May 1978. The production program of the base amounts to 5.2 million leva per year.

The base can repair high tension electric motors, machinery operating with direct current, and explosion-proof low tension electric motors.

Laboratories for metal control and weldings, OTKK [Technical Control Department], and units for the drafting of design and technological documents and production preparations have been set up.

In 1979 the Kozloduy BREO produced goods worth about three million leva. The base also developed a one-of-a-kind container for checking the body of the VVER-440 reactor of the AETs, thus saving substantial funds. Important equipment was produced for the thermoelectric plants within the system, such as drum-scraper metering devices, work wheels for grinding fans, bodies of air and smoke fans, pressure containers and reservoirs, and others.

The completion of the second stage of the base will create conditions for expanding the production of auxiliary equipment for the AETs.

Between 1980 and 1982 the Kozloduy BREO will be expanded (second stage) with the addition of three industrial premises. The production program will be expanded by including the production of spare parts, repair appliances, and some type of atomic systems.

A modern hammer-press section will be built. The Energoremont SO [Economic Trust] will organize a cooperated system with the castings plant in Kresna for the manufacturing of special castings of steel, cast iron, and nonferrous metals.

The completion of the second stage will provide the solution to a problem of essential significance in the building of power projects: anti-corrosion lining and rubberizing of containers and pipelines.

Workshop for the Repair of First Section Installations

In addition to general purpose repair capabilities, the nature of the production process in the nuclear power plant calls for the development of capabilities for the repair of installations which have operated in the strict regimen area. The main buildings of the power plant contain some deactivation systems whose possibilities are rather limited.

Repairs of first stage installations are related to a number of characteristics and requirements affecting both the equipment and the personnel. The equipment calls for special installations for transportation to the repair shop where, along with cleaning and lubrication operations, it must be deactivated with special solutions on the basis of a specific technological discipline for the separation and storage of waste--liquid (solutions, oils, and so on), soft (threads, clothing, and others), and solid (shavings, instruments, and others).

The personnel in this workshop must obey the general requirements for personnel working in an environment containing radioactive pollution. A number of other requirements must be observed in terms of the ventilation system, purification of the air, waste water treatment, and so on.

The workshop for the repair of first stage installations, currently being designed, will insure their repair along with the capital repair of a power block and the running repair of the second. Meanwhile, the remaining blocks will operate normally.

The workshop will have facilities for disassembling main circulation pumps, their electric motors, conduits for SUZ [Control and Shielding Systems], main blocking valves and other armatures, heat exchange systems, pumps, low tension electric motors, fans, and others.

The workshop will have a section for pressing and briquetting of shavings, laboratories, drying premises for engines, an instruments workshop, and others.

The size of capital investments has been substantially reduced through the utilization of many joint buildings, equipments, and systems.

The workshop will be equipped with a special system for docimetric control and biological protection facilities will be provided in the respective premises.

Training Center

The specific nature of the nuclear power industry requires the steady upgrading of the skills of the operational personnel, the improvement of their knowledge and skills, and maintaining it in a state of readiness. This cannot be achieved exclusively through theoretical studies but calls for systematic personnel training under complex emergency conditions. This applies both to the training of existing cadres as well as the personnel of the new blocks scheduled for commissioning.

To this effect the Kozloduy AETs is building a training center equipped with laboratories for various subjects, classrooms, a projections hall with about 700 seats, and others. Subsequently, a simulator for the 440 megawatt and 1,000 megawatt blocks will be added to the training center. The training center will be used also by the nuclear power industry technical school located in Kozloduy and for holding international meetings, symposiums, conferences, and so on.

Construction-Installation Base

In the building of the first and second stages of the Kozloduy AETs, the output requirements for construction and installation were fully met by the developed facilities at the site without requiring, even in the most stressed construction periods, the delivery of structures or installations by other producers.

However, the requirements of the 1,000 megawatt blocks would require a radical reconstruction of the base part of which will be used to meet operational requirements as well.

In accordance with the Council of Ministers decision a new modern construction and installation base will be built to provide all the necessary prerequisites for the building of the new capacities within the stipulated short times with considerably stricter requirements. Because of the convenient transportation connections with the site of the second nuclear power plant, this base will be used for the production of construction and installation items and to meet the requirements of the second power plant as well.

Warehouse for Soft Polluted Waste

Some quantities of soft radioactive polluted waste develops in the course of the operation of the plant: clothing, threads, rags, and so on. Their processing and storage creates certain difficulties. This was the reason for the building of a warehouse for such purposes. It consists of reinforced concrete cells whose insulation will be achieved in two stages: the first before packing them and the second which will involve their sealing. The dimensions of the storage area will make it possible to retain properly pressed waste for a period of 10 to 15 years.

Shop for the Processing and Storing of Radioactive Waste

The problem of processing and storing liquid radioactive waste which contain components with a long half-life is one of the most complex in the operation of nuclear power plants. Our specialists from the Institute of nuclear research and nuclear power industry, Energoproekt NIPPIES, and Kozloduy AETs have joined efforts to resolve the problem through the development of various alternatives for the processing of radioactive waste. Global experience in this area is being energetically studied as well. At the same time, Soviet organizations are being consulted for purposes of designing and building such a shop with their cooperation, based on the bitumen lining. It is believed that its construction could be undertaken at the beginning of the next five-year plan.

It is worth mentioning that the building of the Kozloduy nuclear power complex is being paralleled by the extensive urbanization of Kozloduy. A program has been drafted for the next 5 years stipulating the building of a number of new sports, health, training, and commercial installations, heat supply facilities, and others. This will help to improve the living and recreation conditions of the workers and specialists of the biggest energy complex in the country.

5003
CSO: 2200

BULGARIAN SUBSYSTEM RECEIVES INTERNATIONAL APPROBRATION

Budapest SZAMITASTECHNIKA in Hungarian Jul-Aug 80 p 5

[Article by Imre Szentivanyi: "International Approbation of the 100/200-Megabyte Bulgarian Subsystem"]

[Text] The new, series-produced ESZ-5567 100/200-Mbyte disk control unit, ESZ-5667 control module, ESZ-5067.02 2x100-Mbyte disk drive unit (IZOT 5066E), ESZ-5067 1x200-Mbyte disk drive unit, and their 100-Mbyte (ESZ-5266.01) and 200-Mbyte (ESZ-5267) disk packs were tested successfully also before an international committee, in Sofia.

The Bulgarian-made ESZ 1035 B computer, and the OS/ESZ 6.1 operating system were used in the approbation tests.

The control unit can be connected to (one or two) block-multiplexor or selector channels of an ESZR Series 2 computer. To the control unit one can connect at most four control modules, each with a maximum of eight axes, with a capacity of 100/200 Mbytes per axis (for example, eight ESZ-5067 or four ESZ-5067.02 drives).

In this way the control unit is able to service 6400 Mbytes. The control unit is equipped with sophisticated microdiagnostics, and it is able to locate and explain errors without interrupting the operating system. The necessary microprograms are stored on a floppy disk (ESZ-5074). The subsystem is built with MSI TTL integrated circuits. Special-purpose equipment has been developed to make repairs and maintenance more efficient (for example, the IZOT A547E TIDU, the IZOT A548 head tester, etc.). The subsystem successfully passed the bilateral GDR-Bulgarian tests using an ESZ-1055 computer and the OS/ESZ 6.1 operating system in the SVS mode (ESZ-5567-5667-5067.02 subsystem); and it also passed the Czechoslovak-Bulgarian tests using an ESZ-1025 computer and a DOS/ESZ 3.0 operating system and an integrated interface (ESZ-5667-5067.02 subsystem). The delegations were able to acquaint themselves in detail with the susbsystem's production process.

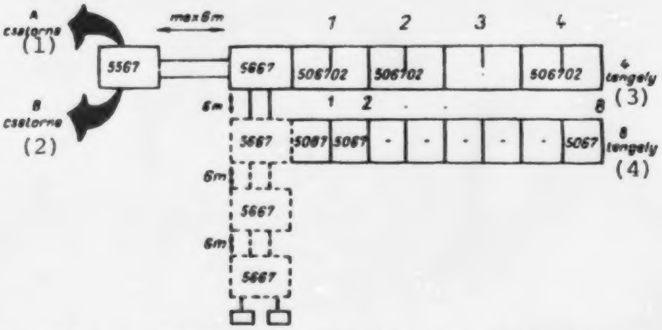
The 100-Mbyte subsystem will be supplied to Hungary already this year, as a part of the Bulgarian-made ESZ-1035/B computer.

The Bulgarian equipment is able to replace the following IBM or MEMOREX models:

A bolgár berendezések a következő IBM, illetve MEMOREX típusokat helyettesíthetik:

(1) Megnevezés	IZOT (ESZR)	IBM	MEMOREX	BASF
100/200 MB vezérlő (2)	5567	3830—2	3672	6030
100/200 MB vezérlő modul (3)	5667	3333—11	3673	
2×100 MB meghajtó (4)	5067.02	3330—1	3670	6230
2×200 MB meghajtó	5067.04	3330—11	3675	
1×200 MB meghajtó	5067			
LEMEZ-CSOMAGOK: (5)				
100 MB	5266.01	3336—1	MARK X	626
200 MB	5267	3336—11	MARK XI	

Key:
1. Designation
2. Control unit
3. Control module
4. Drive
5. Disk packs


A csatorna
(1)
B csatorna
(2)
max 6m
5567
5667
1
2
3
4
5067.02
5067.02
5067.02
4 tengely
(3)
6m
1
2
8
5667
5067
5067
5067
8 tengely
(4)
6m
5667
6m
5667

A meghajtó egységek egy lehetséges konfigurációhoz

Drive units in a feasible configuration.

Key:
1. Channel A
2. Channel B
3. Four axes
4. Eight axes

1014
CSO: 2502

NEW METAL PROCESSING TECHNOLOGIES DEVELOPED

Sofia VECHERNI NOVINI in Bulgarian 13 Sep 80 p 4

[Article by Senior Science Associate and Doctor of Technical Sciences Yanko Arsov, deputy director of the Institute of Physical Metallurgy and Metal Technology of the Bulgarian Academy of Sciences: "Intellectualization the Main Trend of Bulgarian Science: Direct Application of Original Methods of Metalworking under Gas Counterpressure Leads to High Economic Results; Institute of Physical Metallurgy and Metal Technology of the Bulgarian Academy of Sciences Increasingly Links Its Programs with Production Practice"]

[Text] The Eighth Five-Year Plan, a five-year plan of technical progress, reveals its inner gist through its intellectualization of the entire cycle of the production process, from scientific research and development to practical exploitation and sales. One of the main decisive factors in raising the social productivity of labor is the development of individual scientific lines of inquiry and the accelerated exploitation of achievements.

Comrade Todor Zhivkov has set as a fundamental task of the scientific institutes to face the most important and timely production problems and to be in the forefront in creating new materials, technologies and new high-quality products so as to improve decisively the efficiency of scientific work.

In fulfillment of this highly important task the scientific research activity of the Institute of Physical Metallurgy and Metal Technology of the Bulgarian Academy of Sciences has been directed towards further development of problems involving application of the methods of material processing under gas counterpressure developed by Academician A. Balevski and Corresponding Member Prof. Iv. Dimov.

> The promise of these methods and their ever-increasing importance for the practical world have made it possible, through purposeful utilization of the institute's key scientific personnel potential, to carry on research and development activity in significant volume and at a high scientific level and solve a number of problems of importance for the national economy.

Our institute conducts fundamental research on the creation of qualitatively new alloys, on the formulation of the technological principles for their production and further processing, and on the creation of laboratory prototypes of machinery for processing materials under gas counterpressure, as well as other special-purpose equipment.

The year 1980 saw the final conclusion of studies in the scientific and technical program, "Expanded Research on, and Practical Exploitation of, Low-Alloy Nitrogen Structural Steels." In the course of the program's execution there were created, and practical exploitation initiated of, new makes of structural low-alloy nitrogen steels possessing high quality indices that guaranteed their wide application in various sectors of the national economy.

Our railway car-building has been almost entirely reorganized on the basis of nitrogen structural steels. Their high quality indices have made possible up to a 30-percent weight reduction of the cars; export opportunities have been created, with exports so far of 3500 cars having a total value of about 85 million foreign-exchange leva.

The country's problems in producing containers for the storage of petroleum products are being solved. Huge tanks with a capacity of 50,000 cubic meters are being built of these steels.

Gas pipe has been produced and the need thereof for the USSR-Bulgaria pipeline met, wherewith pipe imports from Japan and Italy have been halted and a significant economic effect realized from foreign exchange in a second direction.

The steels have found application also in a number of other products and structural members. With them, our country's obligations involved in the building of the Ust'-Ilimsk and Kimbayevskiy combine in the USSR etc. were performed.

Shaped castings of various aluminum alloys are in regular production. Capacity is being created for the production of large-sized parts, ingots, rims etc., cast by countergravity casting methods. The new technologies guarantee high physicomechanical indices of products, savings of metal are realized, and imports of the expensive equipment used in the present conventional technologies are avoided.

Original methods and equipment have been created for the molding of foaming thermoplastic melts and the production of articles therefrom. This has enabled our country to occupy a leading place in CEMA as the sole producer of specialized machinery for countergravity molding.

In fulfillment of the goals from the BCP Central Committee of putting production on scientific foundations, the Institute of Physical Metallurgy and Metal Technology during the Seventh Five-Year Plan entered into a number of contracts for the study of unplanned assignments whereby problems of Ferrous Metallurgy, Metal Chemistry, and Hydraulics State Economic Trusts and of Cables and Conductors Economic Combine etc. were solved. Technologies were developed for the casting of various parts, research was done on new materials for use in motor-vehicle and truck construction, and a new make of steel for the production of fork lifts for power trucks etc. was introduced. The adoption of these developments in producer plants led to the realization of significant economic effect.

A number of other examples can be cited, too.

In the production-training center that is being set up at the Institute of Physical Metallurgy and Metal Technology, Bulgarian and foreign specialists will be trained and personnel employed on problems of material processing under gas counterpressure will constantly receive further training.

These successes show the capabilities of the Institute of Physical Metallurgy and Metal Technology, besides dealing with its fundamental functions, of actively participating in both the solution and practical exploitation of a number of applied problems of important significance for the national economy.

The main task, however--in the spirit of the party decisions to constantly increase the role of Bulgarian science and link it more closely with production problems--is to create conditions which will permit widening the application of methods of materials processing under gas counterpressure, as well as putting into practice the principles of intellectualization, which are organically linked with the development and application of these methods.

6474
CSO: 2202

SPECIAL ASPECTS OF THE OPERATION OF NURSING UNITS FOR TREATMENT OF MASS BURNS

Budaest HONVEDORVOS in Hungarian Vol 31 No 3-4, Jul Dec 79 pp 159-166

NOVAK, JANOS, lieutenant-colonel,medical service, candidate of medical sciences

[Abstract] Since at the present time there are only about 10 surgeons in Hungary fully qualified and engaged in treating burn trauma, it is obvious that adequate treatement of mass burns (for example after a nuclear attack) rests primarily on the nursing staff and general surgeons. Training of such staff is therefore a primary prerequisite for the establishment and proper operation of mass burn treatment centers. Special attention must be given to the training of the nursing supervisors since full specialist training of the general nursing staff is a practically unmanageable task. The Ministry of Health approved a realistic guideline for a 100-bed unit: Five physicians, five operating-room nurses, eight fully trained nurses, 20 nursing aids, eight orderlies, three rehabilitation therapists and laboratory assistants, and one administrator. Factors to be considered include medical and nursing training, mental strain on the medical and nursing staff, long average residence time of the patients in the facility, higher percentage of surgical therapy than in general medical establishments, higher percentage of patients requiring intensive care than in general medical establishments, the need for training in many specialties, higher costs of maintaining the facility, and research aimed at developing improved approaches for the therapy of large numbers of burn patients. Ultimately, the facilities to be established must be adapted to the existing factors in the above terms, and it is recommended that separate facilities be established for civilian cases and military situations (the latter may be established in the field and/or as adjuncts to existing hospitals). References 26: 14 Hungarian, 2 Russian, and 10 Western.

2542
CSO: 2502

UDC: 632-934.1:632.954::632.154

ANTIDOTES TO PLANT-PROTECTING AGENTS

Budapest MAGYAR KEMIKUSOK LAPJA in Hungarian Vol 35 No 6, 1980 pp 282-286

RAJNAI, KALMAN, Nitrokemia Industrial Works, Fuzfogyartelep

[Abstract] Undesirable side effects of plant-protecting chemicals may be reduced or eliminated by the use of appropriate antidotes. Some antidotes are used to pretreat the seeds before planting; most antidotes are used in admixture with the herbicides. Typical examples of the former type are halogenated 2-hydroxyiminoacetanilides, halogenated arylsulfonamides, halogenated arylhydantoins, N-substituted dithiocarbamates (in the form of their amino salts), and halogenated isatins or oratin oximes. Among the advantages of the antidotes used in admixture with the herbicides are convenience and the fact that overdose of herbiicdes causes lesser damage because of the simultaneously increased concentration of the antidote. Among these andidotes, the literature reports about the following compounds: oxazolidine and thiazolidine derivatives, sulfur-containing chemicals such as substituted sulfonates (2-bromo-ethyl-methane (ethane) sulfonate for example), benzenesulfonyl-o-fluoroanilide, bis-(3, 3-dichloroallyl) sulfide, dicarboxylic acid amide derivatives such as N-2-fluorophenyl-phthalic acid, substituted acetamides, and so forth. No generally accepted test methods or standards exist for the characterization of the effectiveness of an antidote. It is likely that the various antidotes exert their effect via different mechanisms. Most of the work so far has been carried out on the effect mechanism of N, N-diallyldichloracetamide (R-25 7 88). This compound has markedly increased the activity of glutathione-S-transferase at the low concentration of 0.01 ppm, and it is likely that its effect is due to the activation of enzymes. Other possible mechanisms include delaying the absorption of the herbicide or stimulating the growth of the crop plant. Figures 4; references 22: 3 German, 1 Hungarian, and 18 Western.

2542
CSO: 2502

PNEUMATICS IN THE WAKE OF ELECTRONICS

Budapest FINOMMECHANIKA MIKROTECHNIKA in Hungarian Vol 19 No 6, Jun 80
pp 190-192

SZALAY, FERENC, graduate mechanical engineer, Medicor Works, Department MF
[Engineering Development] I

[Abstract] Miniaturized pneumatic elements follow the development of minaturized electronic elements. Many of the principles governing the design and construction of electronic elements also apply to pneumatic elements. The Linear Dynamics company in the United States introduced the PNEUTRONICS pneumatic system on the market, a system which features some novel approaches in this field. Since active pneumatic elements are often electrically operated, certain pneumatic elements may be incorporated in printed circuit boards. At the present time, the PNEUTRONICS system offers the following elements: electromagnetic valves (two- and three-way), pressure microswitch (capable of being actuated by overpressure or by vacuum), pneumatic edge connector (serving as pneumatic/electronic interface on printed circuit boards), pneumatic bus (rail) (to distribute or combine the pressure from the pressure medium), and various auxiliary components (such as flexible silicone-rubber tubing, various distributors and connectors, stops, and the like). Pneumatic, and in some instances also hydraulic, analog or digital systems may be made up of the pneumatic and electronic elements involved. These systems may be used to carry out open- and closed-loop control as well as logical functions. The potential applications of pneumatics are many. They include uses in laboratories; sampling, transfer, and metering of various media, for example, in medical technology; control of part-manufacturing automata; metrology; aeronautical engineering; and astronautics. Figures 5; references 2 (Hungarian).

2542
CSO: 2502

UDC: 621.391.63:631.7.068

COST EFFECTIVENESS OF THE ADOPTION OF FIBER OPTICS TECHNOLOGY

Budapest HIRADASTECHNIKA in Hungarian Vol 31 No 7, 1980 pp 241-253

HORVATH, GABOR, MARKUS, EDIT AND SALLAI, GYULA, Dr, graduate electrical engineers, staff scientists at the Experimental Institute of the Postal Service

[Abstract] A review, based on data published in the literature and on current prices prevailing in Hungary, is presented on the cost effectiveness of the introduction of fiber optics in telecommunication systems with the aim of assisting the postal service in determining whether, and, if yes, where and to what extent fiber optics should be planned for to achieve adequate and--if possible--superior communication service performance in an economical and--if possible--cost-saving manner. The following subjects are disucssed: principles of light-optical transmission (cable types, optical terminal devices, transmitter elements, receiver elements, selection criteria) and designing of connections (selection of the use area, designing of sectors, damping). Economic calculations are presented (comparisons of various systems, starting cost data for various transmission systems, terminal costs, costs which are related to the length of the transmission path, repetition costs, methods of calculating), and evaluation of available technical and economic data. An evaluation of the data and assessments provided indicates that fiber optics can be gradually introduced in a cost-effective manner, starting within a few years with transfer and rural networks, and later also with trunk connections (using appropriate repeaters in appropriate distances). The rate of development is almost exponential and further breakthroughs and improvements may take place so that currently forecast development may become obsolete. Figures 11; references 14: 3 German, 6 Hungarian, and 5 Western.

2542
CSO: 2502

UDC: 621.313+621.316:534.322.3.08

ERRORS OF MEASUREMENT AND EVALUATION IN THE DETERMINATION OF THE AUDIO OUTPUT OF ELECTRICAL MACHINERY AND EQUIPMENT

Budapest ELEKTROTECHNIKA in Hungarian Vol 72 No 12, 1979, pp 338-344
manuscript received September 1979

TIMAR PEREGRIN, LASZLO, Dr, graduate electrical engineer, candidate of technical sciences, associate professor at the Department of Electrical Machinery, Budapest Technical University and YANG, S,J., Dr, graduate electrical engineer, lecturer at Heriot-Watt University, Edinburgh

[Abstract] Errors in the measurement of the sound output of electrical machinery and equipment arise because i)the sound source is not an ideal point source so that no spherically symmetrical audio field develops, ii)the acoustical environment is not spherically summetrical either but is close to hemispherical owing to the rigid floor, and iii)the sound-measuring instruments cannot be placed ideally in terms of layout and number of probes. Errors due to these factors were investigated theoretically and correction factors calculated. Empirical methods for considering the causes of the errors in measurement and subsequent evaluation were discussed. Special emphasis was given to possible errors caused by the fact that most measurement data originate form the close vicinity of the sound source. Too many errors enter the measurements due to the fact that such measurements contain numerous assumptions, not all of which are justified on the basis of experimental studies. Major improvement in the accuracy of the results of the evaluations could be made by using the approach described. Figures 5; references 15: 1 German, 4 Hungarian, and 10 Western.

2542
CSO: 2502

DESIGN OF A HIGH-RESOLUTION PRECISION POSITIONER

Budapest FINOMMECHANIKA MIKROTECTHNIKA in Hungarian Vol 19 No 7, Jul 80 pp 193-197

PETRIK, OLIVER, Dr, professor, Department of Optics, BME [Budapest Technical University]

[Abstract] Design criteria for precision positioners with high resolution (0.1 - 0.01 μm) over a relatively wide range (100 - 300 μm) and with a high degree of reproducibility, as required, for example, in the manufacture of integrated circuits, are discussed. Insofar as the precision movement is concerned, this can be accomplished by direct means or via a transfer unit. Direct actuators may be mechanical (manually or automatically controlled), hydraulic, pneumatic, electromagnetic, or based on thermal dilatation. The transfer units are employed to speed up the movement; this may be accomplished by means of d.c. servo motors of which the rotary movement is converted into straight-line movement. The mechanism of the transfer units must be made up of elastic elements; various parallel springs may be used to ensure this. Designs with low hysteresis properties have been described in the literature. One such design employs a rigid frame elastically supported on its four corners. It has a transfer coefficient of 16.22, a natural circular frequency of 18,849.5 rad/sec, and a damping coefficient of $19.56.10^{-4}$. This design features satisfactory dynamic performance and simple construction. Measurements to assess the dynamic performance are described; they use the dynamic method involving the measurement of the free oscillations after pulse-triggered start by means of a piezoelectric accelerometer and display of the signals obtained on an oscilloscope screen. The apparatus featuring this design works well even with movements having a dynamics of only a few Hz. Figures 7; references 3: 1 Western, 1 Hungarian, and 1 Russian.

2542
CSO: 2502

POLISH ACADEMY OF SCIENCES ACTIVITIES, PERSONNEL

Warsaw NAUKA POLSKA in Polish No 5, May 80 pp 103-108

[Excerpts] Educating for Peace

The Main Administration of the Polish Teachers' Union, under the auspices of the World Federation of Scientific Workers, organized an international seminar in Warsaw from 21 to 22 March 1980 on the subject: "Teachers and scientific workers in relation to the problem of educating societies in the spirit of peace." Representatives of the various disciplines of knowledge took part in the seminar, including pedagogy, sociology, history, philosophy and political science, as well as college teachers, scientific workers, representatives of social organization and also representatives from Czechoslovakia, the GDR and the Soviet Union.

The sessions were opened by Boleslaw Grzes, president of the Polish Teachers' Union, who emphasized the fact that educating in the spirit of peace is the moral obligation of teachers and scientific workers. Then the opening paper of the sessions entitled "The Development of Ideas of Educating for Peace on the International Forum" was presented by Professor Janusz Gilas of Nicholas Copernicus University [UMK] in Torun, and the secretary of the Central Committee [CK] of the Union of Workers of Education, Higher Learning and Science of the USSR Maria Kozlova presented a paper entitled "The Problem of Detente and Peaceful Coexistence and the Idea of Educating for Peace." A study done by the Japanese Association of Scientists treating questions of the development of international cooperation in the light of the problem of educating for peace was also presented.

During the discussion, the complexity of the problems of educating societies in the spirit of peace in the contemporary world, which is full of numerous conflicts of interest and tendencies, was pointed out. Attention was called to the need for governments to conclude suitable conventions and to undertake the appropriate resolutions to make the education of societies in the spirit of peace of legal responsibility.

The seminar occasioned the discussion of many phenomena of an international nature. The composite elements of the concepts of educating societies in the spirit of peace and educating for disarmament were pinpointed. For the first time, certain tasks in the area of educating for disarmament were laid out in accordance with the UN declaration of 1978 and the activity undertaken in this spirit by UNESCO, which will organize a special congress devoted to this question in 1980.

At the end of the seminar a resolution was declared in which participants made an appeal to all teachers and scientific workers for the broad dissemination of ideas of educating in the spirit of peace, for the undertaking of endeavors toward educating for disarmament. An urgent need was determined to work out an international program of action in this area, and to develop the UN declaration of educating for peace in the form of international agreements and binding legal documents in particular countries of the world.

On the Question of Environmental Protection

From 11-12 January 1980 in Konin a conference of the Committee of the Development of Midwestern Macroregion was held on the topic of environmental protection and the development of the environment in the midwestern macroregion.

Participants in the conference included: regular member of the [PAN] Polish Academy of Sciences Wlodzimierz Michajlow, Professor Zdzislaw Fedorowicz in place of the head of the Planning Commission of the Council of Ministers, first secretary of the PZPR Voivodship Committee in Konin Andrzej Borkowski, Konin Governor Henryk Kazimierczak and deputy governors from Bydgoszcz, Kalisz, Konin, Pila, Poznan, Torun and Wloclawek, i.e., the voivodships which make up the midwestern macroregion.

Scientific-technical Progress and the Development of Industry

On the initiative of the departments of Heavy Industry, Transport and Construction, and of Science and Education of the PZPR Central Committee, the Higher School of Social Sciences of the PZPR Central Committee, the Institute of Planning of the Planning Commission of the Council of Ministers, the Institute of Basic Problems of Marxism-Leninism of the PZPR Central Committee and the Chief Technical Organization organized an all-Poland conference on the topic: "Scientific-technical progress as a basic factor in the development of industry." The conference took place in Warsaw from 3 to 4 January 1980 and was attended by over 300 persons--scientific workers from the Polish Academy of Sciences, from institutions of higher learning and research-developmental facilities of industry, party and economic aktivs, representatives of economic organizations and the technical community.

The goal of the conference, which was opened by Professor Wladyslaw Zastawny, rector of the Higher School of Social Sciences, was the presentation and discussion of problems relating to: scientific-technical progress in the development of the economy, factors and directions of development of science and technology, and the mechanisms of directing research efforts, developmental tasks and training in industry. In general, 23 papers were presented during plenary sessions and in problem sections. Among those who participated were the following: alternate member of the Political Bureau of the PZPR Central

Committee, the head of the Planning Commission of the Council of Ministers, Deputy Minister Tadeusz Blaszczyk, spoke on socioeconomic development and scientific-technical progress in the 1980's; Minister of Science, Higher Education and Technology Janusz Gorski and the scientific secretary of the Polish Academy of Sciences and regular member of PAN, Jan Kaczmarek, together presented the real problems of the central direction of scientific activity in the light of the resolution of the 12th Plenum of the PZPR Central Committee and the significance of basic research for technical progress; the chairman of the Chief Technical Organization [NOT], Minister of the Machine Industry Aleksander Kopec, devoted his paper to a discussion of the role of the community of engineers and technicians in the socioeconomic development of the country; director of the Institute of Basic Problems of Marxism-Leninism Andrzej Werblan presented the social aspects of scientific-technical progress. Among the topics discussed in problem sections were: the organization of the processes of scientific-technical progress, initiating and planning the development of science and technology, and the conditions and tools of the implementation of plans of scientific-technical progress. Participants shared the practical experiences of particular subbranches of industry, such as the shipbuilding and aviation industries, which are most eager to take advantage of the achievements of science, in the introduction of scientific-technical progress.

Among the subjects treated in disucssion were the Slack Polytechnic's achievements in the cooperation of science and economy of the region. Representatives of the technical sciences of PAN presented their achievements in the area of completing important professional reports, ranging from those relating to the directions and methods of improving machine design to those concerning the perspectives of the development of the technology of fiber-optics, which is of importance to communications and information science, and to the perspectives of the development of scientific equipment. The role of electrical energy in meeting the growing need for it in industry was noted; the need for strengthening vocational ethics and the sense of responsibility of persons participating in the process of putting necessary innovations into practice was emphasized; and attention was called to the need for disseminating knowledge in the field of modern management organization among the technical community and among the directorial cadre.

Among other things, it was ascertained that social and economic goals for the 1980's can only be achieved by increasing management efficiency, the basis of which is technical and organizational progress.

Director of the Department of Science and Education of the PZPR Central Committee Jarema Maciszewski summarized the sessions.

Forecating the Development of Information Science

The 15th Conference of the Diebold European Research Program [EPB] convened in Krakow from 14 to 15 January 1980. The author of this program 25 years ago was John Diebold in the United States; the program has been implemented in similar fashion in Europe since 1964. Participants in the European Diebold program are informed immediately about the production of new computer hardware, about its software and about its utilization in management. Twice yearly conferences are organized. The last one was held in Brussels in March 1979. In addition to this, during the course of the year all those who are interested receive reports compiled by this international organization.

Socialist countries participating in the Diebold program besides Poland are Hungary and the GDR. Poland has over 1,000 users, who systematically receive a packet of the newest information about developments in this sector.

The Association of Information Science, which has 16 enterprises and employs 86 computers of varying capacities, plays a major role in the workings of this program.

During the convention many issues were taken up, including a discussion of the course of action to be taken to reduce the disproportion between the growing efficiency of computer hardware and the insufficient productivity of programmers and designers (which is a worldwide phenomenon). The creation of information systems, which now takes several years, must be considerably shortened. Problems relating to the construction of new computer hardware in conjunction with the introduction of the gradual decentralization of processing were discussed. With more and more minicomputers in operation in offices and institutions, the role of large computer centers is questioned.

The organizers of the Krakow conference were: The Association of Information Science, the Center of Designing and Application of Information Science and the Electronic Computer Computation Office in Krakow. Head of the Diebold EPB Dr Wolfgang Fassbender was one of the lecturers.

The Production and Processing of Fiberglass

A symposium of the Composites Section and the Ceramics Section of the Scientific Committee on Materials of the PAN, devoted to the role of production and processing of fiberglass, was held at the Krosno Glassworks on 15 January 1980. Besides representatives of this fiberglass production center, approximately 20 well-known experts from university centers, institutes and scientific institutions throughout the country participated in the symposium.

The program of the conference consisted of the following papers: "The Application of Fiberglass in Composites" by Assistant Professor of Engineering Waclaw Krolikowski (Szczecin Polytechnic); "Kaolin Fibers" by Professor Stanislaw Pawlowski (Slask Polytechnic); "Carbon Fibers for Composites" by Professor Roman Pampuszek (Academy of Mining and Metallurgy); "Alkali-resistant Fibers" by Professor Waclaw Tuszynski (Institute of Civil Engineering in Warsaw).

During the discussion views were expressed on the subject of the possibilities of the application of fibers in practice. There was a discussion about a program for the development of the production of fiberglass at the

Krosno Glassworks and about the processing of fiberglass from the viewpoint of its application to the needs of the coal industry, electronics, electrotechnics and construction materials.

Symposium--RENIOM 80

The Institute of Physics and the Chemistry of Metals of Slask University in Katowice organized the Third All-Poland Symposium from 29 to 31 January 1980 in Katowice on the topic "Inelastic Relaxation and Magnetic Delay in Solid States"--RENIOM 80.

Participants in the symposium were physicists, physical metallurgists and scientific workers in other specialties from all national academic centers and institutes of PAN, as well as from several scientific-research laboratories in industry involved in the application of internal friction and the disaccommodation of magnetic permeability in the physics of metals. Representatives from the appropriate foreign centers in France, Rumania, Hungary and Czechoslovakia were likewise present.

Questions of Potato Production

A scientific-technical conference of The Association of Engineers and Technicians in Agriculture [SITR] was held in Sycewice on 15 January 1980. It was devoted to the organizational and economic problems of potato production, with particular attention being given to the conditions of its cultivation in the Slupsk Voivodship. The conference was organized through the efforts of the Voivodship Branch of SITR.

Papers treating the subject of the conference were presented by: the director of the Potato Institute in Bonin, Assistant Professor Edward Kapsa; Professor Kazimierz Piechowiak of the Agricultural Academy in Poznan; Dr Waldyslaw Stachurski of the Potato Institute in Bonin, and the head of the Voivodship Branch of SITR in Slupsk, Stanislaw Czupajlo, M.A. in Engineering.

Issues of Food and Nourishment

Under the direction of the president of PAN, regular member of PAN Witold Nowacki, a conference was held in Warsaw on 18 January 1980 on the subject "Polish Science for Food and Nourishment." Participants in the conference were: the secretary of the PZPR Central Committee Jozef Pinkowski, chairman of the Central Union of Agricultural Cooperatives [CZSR], discussing "Peasant Self-help," minister Jan Kaminski and scientific workers representing various scientific disciplines.

The purpose of the conference was to attempt to define the possibilities for hastening the development of the nourishment complex through the improved utilization of existing scientific potential. The role to be played in this area by agricultural and forestry scientists was noted, and the degree to which other areas of science should be included was suggested.

The Agricultural Development of the Rudawa

The Association of Engineers and Technician in Agriculture, the Agricultural Academy in Krakow, the Zootechnical Institute and the PAN Branch in Krakow organized a scientific-technical conference in Krakow on 18 January 1980 with the theme of the agricultural development of the Rudawa and water purity in this river.

The purpose of the conference was to draw attention to the multitude of existing problems connected with the rationalization of water management, the influx of agricultural chemicals into surface waters, and the consequences of the development of the Krakow urban-industrial center, all of which lower the water quality in the Rudawa. Among other topics, papers treated the state of and need for land reclamation in the Rudawa River basin, the influence of chemical means of plant preservation on the contamination of waters and the potential of the Rudawa as a water source for Krakow.

Polish-Soviet Cooperation in Agriculture

The Main Administration of the Society for Polish-Soviet Friendship [TPPR] in conjunction with Section 5 of PAN--Agricultural and Forestry Sciences, the minister of agriculture, the Institute of Truck Farming and the CZSR "Peasant Self-help" organized a conference in Skierniewice on 28 January 1980 with the theme of Polish-Soviet cooperation in the field of agriculture. Approximately 150 representatives of agricultural institutes, higher schools and farm workers participated in the sessions. The purpose of the conference was to survey the more important real topics and problems of agriculture which must be made known to the people in general.

The program of the conference consisted of eight papers, which were delivered by such specialists as: the secretary of Section 5 of PAN, corresponding member of PAN Zbigniew Gertych, director of the Truck Farming Institute in Skierniewice; vice president of PAN, regular member, of PAN Szczepan Pieniazek; advisor to the USSR Embassy in Warsaw, Dr Ignatiy Kuzhnetsov; Director of the Institute of Agrarian Policy Professor Boleslaw Struzek.

The basic problem of the development of concentration and specialization in agricultural production and the conditions for and development of forms of intereconomic coproduction and agricultural-industrial integration in the USSR were the topics under discussion. In the discussion of a program of cooperation of CEMA countries in the field of agriculture to 1990, Polish-Soviet cooperation in the area of the development of agricultural sciences and the effect of such cooperation on the development of agricultural practice in Poland were emphasized, as well as cooperation in the form of cadres of specialists in agriculture.

Participants in the conference visited the Skierniewice scientific institutes: the Institute of Truck Farming and the Institute of Pomiculture and Floriculture.

Plant Protection

The Institute of Plant Protection in Poznan organized an international scientific session on the subject of plant protection. It was held on 7 February 1980 in Poznan, and participants represented the national scientific community and the scholarly community from Belgium, Czechoslovakia, Japan, the GDR and the USSR.

Topics discussed were the application of chemical and biological means in plant protection, toxicology and the side effects of pesticides, as well as the so-called integrated methods used in agricultural practice.

Water and Food

From 11 to 14 February 1980 in Szczecin, the 11th Symposium of the PAN Committee of Food Technology and Chemistry and the Agricultural Academy in Szczecin was held to discuss problems connected with the role of water in food production.

During the conference papers were delivered by the following: Professor Adolf Herubala--"Water As an Element of Food;" Professor Edward Kolakowski--"Water As the Environment of Food Production;" Assistant Professor Tomasz Wolski--"The Rational Management of Water in the Food Industry." Discussions were also held in problem sections. Much attention was paid to questions connected with the preparation of cadres for the food industry in higher schools.

The Management of Water Resources

The Institute of Meteorology and the Marine Economy [IMGW] with the assistance of the Italian firm TECNECO organized a Polish-Italian scientific symposium from 24 to 26 March 1980 in Warsaw on the subject of the management of water resources. The Italian firm TECNECO is involved in water engineering, among other things, and questions of the marine and agricultural economy.

Participants in the symposium--besides scientific workers and Polish specialists representing, for example, IMGW, the Office of the Government Plenipotentiary for Affairs of Wisla Management and institutions of higher learning--were Italian specialist from research institutes and Padua and Bari.

The achievements of both countries in the field of the rational management of water resources in regional systems and in the protection of their quality, as well as the economic aspects of water protection were presented in several dozen papers.

Cybernetics in Medicine

From 28-30 January 1980, the 4th National Scientific Conference devoted to biocybernetics and biomedical engineering--an important field of contemporary biology and medicine--was held in Poznan. The meetings were organized by groups with an interest in these problems, i.e., committees of the PAN, scientific societies, the Poznan Academy of Medicine and the Chief Technical Organization [NOT]. The conference included the participation of 420 specialists from Poland and from Bulgaria, Czechoslovakia, Yugoslavia and the Soviet Union.

Approximately 200 papers were delivered treating such questions as: the utilization of experiments in cybernetics and information science in medical studies to diagnose illnesses and to replace certain internal organs with their artificial counterparts; the possibilities for controlling the physiological processes of man; the possibilities for constructing robots and automated models, for example, to be used in rehabilitation and in helping to effect an improvement in the working conditions of man.

Thirty Years of the Institute of Thermal Engineering

In December 1979 The Institute of Thermal Engineering [ITC] in Lodz celebrated 30 years of its work. On this occasion a scientific conference was held on 19 December 1979, in which representatives of the government and the party, scientific workers, representatives of the MEGAT Association and of institutions and centers working in conjunction with ITC participated.

An occasional paper was delivered by the director of this center, Professor Wlodzimierz Wisniewski. He remarked on the early work of the institute, which dates from 1949. The first important achievement was the development of an experimental gas turbine. From the beginning of its existence this important scientific center of the power industry has worked closely with industry, which has fostered the development of scientific-research efforts as well as specialization, e.g., in the construction of boilers and turbines, auxiliary equipment and automatic control for power needs.

Presently the ITC employs a cadre of 127 scientific-research workers and 177 engineering-technical workers. They have been engaged in developing new arrangements for the conventional power industry, and for several years for the nuclear power industry. Devices produced at the institute serve not only our production enterprises, but are also exported to the USSR, Yugoslavia, Turkey, China, Bulgaria, Czechoslovakia and the GDR.

In conjunction with the development of the power industry in Poland, in the near future the ITC will engage in working out new design and technological devices and machinery for electric power plants and nuclear electric power and heat-generating plants, both for domestic needs and within the framework of INTERATOMENERGO, auxiliary equipment for the Electric Power Plant in Belchatov, heat-generating boilers, industrial and power boilers with fluidized-bed furnaces.

Outstanding scientific workers and practicianers received high state honors on the occasion of the jubilee.

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CSO: 2602

END

JPRS 76774

7 November 1980

East Europe Report

SCIENTIFIC AFFAIRS

No. 686

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JPRS 76774

7 November 1980

EAST EUROPE REPORT

SCIENTIFIC AFFAIRS

No. 686

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DEVELOPMENT OF BLOC-POLISH COMPUTER DATA SECURITY OUTLINED

Warsaw WIADOMOSCI STATYSTYCZNE in Polish No 10, Oct 80 pp 32-36

[Excerpts] The problem of data security in statistical offices was the subject of discussion at the 18th Session of the Permanent Working Group for CEMA matters on automation of statistical data processing in the autumn of 1979. One method of computer memory hardware security is to apply the so-called paging system. For example, the memory in IBM 370 computers is divided into equal blocks, and a key, which is either four zeros or number-one digits long, is assigned to each block. The second series of the uniform-system computers, such as the EC-1055, also has these features which are being used in the security system.

Knowledge in the field of technological data security under computer processing conditions is still not too well developed in Poland; this is one of the symptoms of the still relatively ineffective dissemination of information science. Without going into the details which were published in a conference report--"Legal Problems of Computerized Information Systems" (Wroclaw, 20-21 May 1976, pp 301-317)--it must be frankly stated that a view of the situation on existing security measures entitled the authors of the report then to formulate carefully their opinion that the Polish electronic centers were still not appropriately prepared at that time to process data of a confidential nature.

Certain systems are especially exposed to penetration. At the current intermediate level of hardware and software which are accessible in Poland, the initial and still faulty attempts to use the so-called multi-access data banks should be considered very carefully. The assessment cited for U.S. conditions by Lance J. Hoffman should be a warning: "...today's state of the art is such that extremely sensitive (confidential) information should not be stored in any multi-access computerized data bank system." The two-year experience of gradually applying modern methods of data security in the computer systems of the Main Statistical Office [GUS] indicates the great importance of this sector in the overall improvement and modernization of state statistical computer systems. Considering the experience acquired from the operation of relatively modern computer hardware installed for the Planning Commission of the Council of Ministers etc and the extensive foreign literature on data security, GUS has conducted more systematic studies in this important sector of computer data processing technology.

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HUNGARIAN-POLISH RELATIONS IN COMPUTER AFFAIRS

Budapest SZAMITASTECHNIKA in Hungarian Jul-Aug 80 p 18

[Article by Bela Igaz]

[Text] Polish-Hungarian computer relations look back over more than 10 years. We can count the start of these relations from the Hungarian appearance of the second-generation ODRA's. A more important move forward, however, came only with the development of the ESZR [Uniform Computer Technology System] program. Among the Polish tasks undertaken in the ESZR we may stress the R30 category, medium-performance computer--which Poland developed together with the Soviet Union--as a means which the domestic users can always acquire through socialist import. It is true that the Soviet Union also is a supplier in this category, but the Polish R32, the so-called "completely automated control system linked to facilities" which serves to solve a specific application goal task, cannot be replaced with anything in the domestic application plans.

To complete their systems the Poles themselves develop and manufacture a significant portion of their necessary peripheral means, and rely only partly on the products of other socialist countries. For example, they were successful, after the perforated tape had passed its peak, in changing over to magnetic tape and the soft disc techniques. Besides the higher performance series line printer which fits well with medium computers in price and performance, worthy of note is the mosaic printer which is outstanding in its category. Display development and manufacture have also reached a level that meets their requirements. According to recent information they are also planning the manufacture of a large capacity (100 MByte and greater) magnetic disc storage.

The series would not be complete if we did not mention the sphere of TAF (telecommunications processing) means and systems developed on the Polish communications industry base, and which is manufactured now in large volume. In February 1980 our Polish partners demonstrated operationally to Hungarian experts the "Tele-JS" subsystem, which is built of a 1 MByte operative memory central units (ESZ 2032); local display systems (ESZ 27910); 48 Kbyte operative memory 16-channel TAF processor (ESZ 83,7101); start-stop terminals (ESZ 8575); as well as terminal systems consisting of cluster and single displays. Our partner achieved important results in the development of the RJAD-2 TAF system. Essentially, it manufactures in series every modeme belonging to every speed category. In addition, on the basis of a SAAB license and on the basis of a LOGABAX license for video terminals they manufacture print out terminals, and among the socialist countries it is the Polish industry that is first manufacturing TAF processors.

In the manufacture of MSZR means, Poland, like its partners, has begun the making of a structure that is near to the profile already existing in the ESZR, which we will not now discuss in its details like the developments of ESZ II and III, and which is built actually on the developed structure.

The Hungarian reader is familiar with the development and manufacturing product composition of the ESZR and MSZR computer technology. Comparing this with the above-outlined Polish computer technology profile, it is evident that our countries have similar tasks in multilateral cooperation. Looking at it more closely, there are important differences as well among our manufactured computer technology means. Such, for example, are our ESZR computers, or among the peripheries the line print out, or among the storages the accomplishment, usability and use specifics of our fix disc, and in a great portion of the cases the manufacturing technologies are also significantly different. Both the similarities and the differences that have developed in the computer technology manufacturing profile in our countries afford possibilities for development, and deepening cooperation and specialization.

It is also well known that among the main tasks of our industrial ministries in bilateral cooperation with similar ministries of other socialist countries, is scientific-technical product and production development activity, preparation of the exchange of goods in manufactured products, their execution and control, the discovery of specialization and cooperation possibilities, etc.

In a given relation the computer technology cooperation is characteristically developed--in addition to the tasks and requirements stemming from multilateral cooperation--for domestic industrial development goals and possibilities and by the effort to attain the goals set earlier by the SZKFP [Computer Technology Central Development Program].

Let us look at several specific industrial development goals as examples and examine these in the mirror of Polish-Hungarian cooperation: it is the task of the domestic industry to undertake an increasing share in the meeting of domestic application demands.

In cooperation with the PPR this means that

--the satisfaction of the demands of domestic users, as evident in selection, can be increased (for example the R-32 computer and the modern data collecting and data processing system, AIR and the TAF AIR's);

--a rise in the technical level of the product structure is suitable for countering the ratio deterioration in commodity trade;

--our products that have a role in cooperation are suitable for balancing imported goods;

--our production development can be realized by intensified use of our existing capacities.

Existing capacities and a developed production structure can be the basis of cooperation or of work distribution and specialization. Such, for example, is the display, the development and manufacture of which in our countries has long been proceeding in volumes reaching a serial magnitude that is economical, and its survival over the medium or long term can be planned.

As a result of actually existing objective cooperation possibilities and limitations, we have aggained important successes in the past 10 years. Our computer technology trade exceeds an annual level of 12 million rubles. Part of the product trade goes directly to consumers, but there is an important ratio which by in direct means consists of peripheries necessary for the completion of our application system (mosiac printer, for example DZM 180) of components (claviature ESZ/olol) or can be accounted upon as an actual part of industrial cooperation.

An understanding was created in the Polish-Hungarian computer technology work group for the preparation of a computer technology agreement over the long term which will be signed at the industrial and foreign trade enterprise level. On the Hungarian side, BUDAVOX AND METRIMEX, with the mediation of VT RT, and on the Polish side the MERA Association are legal entities authorized to sign for the work of preparation.

In the coming years we shall increase mutually advantageous computer technology trade and improve the composition of the goods that serve as the basis of the exchange. We shall seek with intensified care in the whole system to coordinate and systematize each other's subsystems and components. With this, we shall also seek to deepen the possibilities for specialization and cooperation.

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BRIEFS

UREA MACHINERY CONTRACT SIGNED--TECHNOEXPORT, Prague and TEKHMASHIMPORT, Moscow have signed in Prague a contract for delivery of additional CSSR-produced urea plant production units. These two units will become the seventh and eighth urea production units manufactured for the USSR. [Text] [Prague SVOBODNE SLOVO in Czech 26 Sep 80 p 7]

CSO: 2402

DEVELOPMENTS IN BIOLOGICAL SCIENCES REVIEWED

Tirana BULETINI I SHKENCAVE TE NATYRES in Albanian No 2, Apr-May-Jun 80 pp 3-5

[Article by T. Tartari: "Several Trends in the Development of Biological Sciences in Our Country"]

[Text] The biological sciences occupy an important position in the system of natural sciences. Guided by the party's decisions and Comrade Enver Hoxha's teachings, the biological sciences have provided and are providing an increasingly more specific contribution to the development of productive forces and to the development of our country's economy. Biological research is presently being conducted by the agricultural research institutions, the Natural Sciences Faculty, the Higher Agricultural Institute, the Medical Faculty and the recently opened Biological Research Center. A good number of studies and experiments are also being conducted by specialists at the grass roots, especially in the agricultural units.

The major aspects of biological research which have been treated to date by these institutions are, first of all, the genetic improvement of species and hybrids in agricultural crops, especially among the cereal grains, where fine results have been achieved, making a valuable contribution to the great problem of cereal grains which the Seventh Congress of the Albanian Workers' Party brought out. Likewise, applied biological research has been conducted in the area of improving the breed of livestock, especially cattle, sheep and poultry. Certain aspects of soil biology which are important for increasing soil fertility were studied during this period. We observe numerous applications of biological knowledge and methods in the production of vaccines and serums for the prevention of disease in humans and animals. Special genetic research has been conducted in recent years on insect mutations and specific human and animal characteristics. The rudimentary foundations have been laid for research in the field of plant and animal physiology related to the use of micro-elements. Research has been conducted on environmental pollution by chemical substances or by microbic agents. Regarding the study of the country's flora, the first volume on this subject has been submitted for publication, and studies will continue on subsequent volumes. Several positive results have been obtained in the study of the country's fauna, especially in the direction of ornithology and entomofauna.

The upgrading of laboratories and educational facilities at the institutions where biological subjects are developed has recently been intensified, training programs have been improved on many subjects, and textbooks are being reworked for quite a few biological disciplines. The degree of cooperation and collaboration has increased among various institutions and with the production economy for developing various topics in the field of biological sciences.

All of these results reflect the great work which has been and is now being done in our country to implement the tasks of the Seventh Congress for the development of these sciences.

Even so, it is clear that the present state of development of the economy and science in our country demands that we intensify the rate of biological research further and that we raise it to a higher theoretical and scientific level.

First of all, we need to base the scientific theme of various fields of applied biology on scientific concepts and on contemporary research methods, not as a goal in itself, but because present development permits a deeper, more thorough and more precise interpretation of the various experimental results obtained. This permits the theoretical level of research to be enhanced and scientific recommendations to be disseminated with greater conviction and assurance in open production. This means that we should employ more mathematical, physical, biophysical, chemical and biochemical methods, whether they be theoretical or applied. This brings up the task to start working in such other branches as biophysics, general biochemistry and special biochemistry, so that the various biological sciences may aid in their development as much as possible.

With regard to plant physiology, the scientific problems of plant photosynthesis and metabolism, especially in the cereal grains, are on the order of the day to increase the productivity of these crops which are so very important to the national economy and to utilize rationally and more profitably the great investments which our socialist state has made and is making for agriculture. This means to study those significant indices and parameters of physiology which are closely related to high productivity, which parameters should be studies, experimented and interpreted here in our country because they depend on the specific bioclimatic conditions of our country. With regard to physiological research on animals, we should develop that theme which has to with the best utilization of livestock food resources located in our country, because the rational use of the wide range of foods available, like strengthening the food base, is of first hand importance. However, in order to achieve this, it is necessary that we increase research related to the digestibility of certain foods and their combination in various food rations, in various types and categories of animals, in various technological systems, etc. Studies of the role of vitamins, mineral substances, certain amino acids, ferments, etc., which are strong biostimulants in the feeding of animals, merit special attention in this direction.

Research in the area of plant and animal genetics is an important aspect of the biological sciences where we should concentrate our studies. The results achieved up to now in open production from introducing new species and hybrids into agricultural crops and livestock have created convictions about the great role which genetic selection efforts have in increasing productivity, lowering costs and making agricultural work more productive. However, Neither the manimum theoretical nor practical limitations have been reached in this regard. It is therefore clear that a more profound effort toward genetic selection must stant at the basis of the creation of these types of hybrids. The various genetic studies on the manifestation of heterosis, on the use of mutations, on the heredity of qualitative characters, above all in the cereal grains and, parallel with this, in the industrial crops, vegetables, fruit trees, forage crops, in farm animals and poultry, begin to assume special importance here. On the basis of genetic material which has been created and which exists in our country in the form of lines, breeds, etc., we must do further work to increase their number and to enrich them, as the occasion arises, with material from spontaneous flora or crops or domestic breeds of livestock, studying the genetic basis of the latter. Moreover, the genetic fund can and should be enriched by making more ample use of the mutations method and by making various hybridizations between lines or varieties. In this regard, the use of genotypical methods in selecting and evaluating progenies in order to obtain more certain results in enhansing productivity assumes special importance. In the direction of grain genetics, we have a broad front working for the creation of new hybrid corns with an even shorter vegetative cycle and with a higher content of proteins, lysine and methionine, and for the creation of forage corn hybrids which have a genetic potential of over 150 kv of food units per hectare. For wheat, current tasks include the creation of rust-resistant varieties, the enhancement of protein quality in hard wheats for macaroni products, and to expand the cultivation of Triticum wheat hybrids to the frontier zones.

New applications in the field of genetics of technical and industrial crops are expected to increase the productivity and improve the quality of cotton fiber, to create hybrids in the sunflower, to increase the percentage of sugar in sugar beets by means of polyploily, and to create hybrids in vegetable and fruit cultivation.

Numerous aspects of animal genetics, such as the creation of new hybrids in poultry for eggs and meat, hybrids to produce beef and mutton with higher productivity and lower food costs, are expected to be experimented with and applied to general livestock production in our country.

Just as necessary are the studies which need to be conducted on the problem of plant and animal immunity in order to diminish damages from diseases.

A broad field of biological research is that of the study and use of the country's spontaneous flora, which is quite abundant, and the study of relationships between various plant ecosystems, in connection with the preservation and enrichment of our country's environment. With regard to the study of our country's spontaneous flora, fine results have been achieved in the collection, analysis and scientific classification of it. Much more needs to be done in the future to include these resources in industry, pharmaceutics and agriculture, utilizing that which is rich in organic matter, cellulose and various alkaloids, as well as genetic factors which have been created through evolution.

Of first hand importance in this regard are the studies about the relationships of large groups of ecosystems: forests, meadows and cultivated plants. These studies relate to special problems of biomass production by each ecosystem, the reciprocal involvement and influence had by the proper development or lack thereof of one ecosystem over another, and the role of the harmonic development of these plant and animal ecosystems in keeping our environment clean.

The expansion and intensification of the scientific theme with regard to the study of the country's fauna, particularly beneficial fauna, is likewise a current task facing our country biological sciences.

Great scientific interest is being shown in the development of general microbiology, which is closely related and fairly important for raising the research in the field of soil microbiology to a new level in order to improve soil fertility, for the highly valued fermentation processes in the country's food and pharmaceutical industries, and for special microbiology in human and veterinary medicine.

The rapid development of the socialist economy in our country demands, among other things, the establishment of production on a sounder scientific basis, and that the biological sciences, with their objective laws of natural development, constitute a sound base for the advancement of many production fronts in our country.

5658
CSO: 2102

NEW PHOTO PROCESSING TECHNOLOGY DEVELOPED

Sofia ZEMEDELSKO ZNAME in Bulgarian 23 Sep 80 p 2

[Article by Georgi Vasilev: "A World-Standard Bulgarian Invention"]

[Text] Original Technology for New Types of Photographic Materials With Extensive Application

As a result of basic research conducted by the Central Laboratory for Photographic Processes of the Bulgarian Academy of Sciences on the mechanism of interaction between light and solid state substances, the development of new types of photographic materials using an essentially new technology became possible: A dry method through the evaporation of light-sensitive substances in a vacuum. The functional and technological advantages of the new method have been thoroughly substantiated and patented.

It is a question of the production of a number of special photographic materials for industrial purposes--photolithography, microphotography, photo documentations, printing, and recording electrons and ions. Some of them are used in microelectronics and electrical engineering. Their characteristics greatly restrict the process of electronic development. The photographic materials needed for such purposes are not being produced in the socialist countries and must be imported. Tests of Bulgarian plates conducted at the Karl Zeiss Works in Jena, in the GDR, have indicated that in terms of separation capacity they exceed all other such materials known in the world with a sensitivity one thousandfold higher. Naturally, such new materials require the necessary processing conditions and special equipment.

On the basis of silver-free light-sensitive substances a technology has been developed and a pilot line built for the production of photographic materials for flexible printed circuits and flat conductors. The flexible printed circuits and flat conductors, regardless of the way they were produced, are the most progressive method used in putting together electronic and electrical engineering items.

These are one-of-a-kind developments which could place some Bulgarian industrial sectors in a leading position in the world. They are the creative accomplishment of a scientific collective headed by corresponding member Prof Dr Y. Malinovski.

The recognition of scientific achievements of this collective will be the international symposium on model research in photography and new photographic recording systems, sponsored by the Central Laboratory for Photographic Processes of the Bulgarian Academy of Sciences, to be held from 28 September to 5 October in Varna.

The purpose of the symposium will be to provide a detailed discussion of new ideas and achievements related to the mechanism of the photographic process. It is considered that the use of suitable models could contribute to the better understanding of its individual stages. The academic discussion of the results obtained on the basis of model systems could be of decisive significance in improving light recording systems as a whole.

Considering the growing interest in the development of nonconventional photographic materials, the symposium will accept works depicting photographic processes using different inorganic photosensitive substances and the use of new photographic recording media.

5003
CSO: 2202

CZECHOSLOVAKIA

BRIEFS

NEW ETHYLENE PLANT--Prague, 22 Sep--The creation of a large ethylene-producing plant has been completed at the chemical combine named for Czechoslovak-Soviet friendship in the north Czech city of Litvinov. This signifies the fulfillment of one of the key 5-year plan targets approved by the 15th CPCZ Congress. Today's issue of RUDE PRAVO publishes the speech which J. Korcak, member of the CPCZ Central Committee Presidium and premier of the Czech Socialist Republic, delivered at a construction and chemical workers aktiv meeting. The newspaper points to the need for strict economy and better use of oil, more than 90 percent of which the republic gets from the USSR. The International Socialist Division of Labor gives the CSSR great potential for resolving its national economic problems. Thus, long-term cooperation with the GDR has enabled Czechoslovak petrochemical workers to make rational use of capital investments in the construction of the Litvinov complex and to create optimum capacities. Specialization and collaboration between the CSSR and the Soviet Union in this sphere enable Czechoslovakia to concentrate efforts on the development of the small- and medium-tonnage chemical industry. The CSSR's orientation toward producing less energy-intensive output ensures considerable benefits, since precisely the chemical industry consumes up to 21 percent of all the energy produced in the country and 32 percent of total fuel consumption, RUDE PRAVO points out. [Text] [LD261023 Moscow PRAVDA in Russian 23 Sep 80 p 5]

RADIO RELAY COMPUTER INTERCONNECTION--Radio relay interconnection between an EC 1040 computer at the Central Computing Center of the Czechoslovak Academy of Sciences [CSAV] and an EC 1010 computer at the CSAV Geophysical Institute in Prague took place on 25 September 1980. The approximately 8-kilometer line has become the first operational part of a future CSAV computer network. This isolated technological achievement is the first of its kind within CEMA, resulting from cooperation between two CSAV establishments, the Hungarian Research Institute of Telecommunications and the TESLA enterprise. [Text] [Prague SVOBODNE SLOVO in Slovak 4 Oct 80 p 7]

NATURAL GAS DISCOVERY--Natural gas was discovered close to Uhrice, Hodonin district, during oil exploration drilling done by Luzice branch of the Moravian Oil Fields Hodonin enterprise [Moravske naftove doly Hodonin]. The high quality, high-pressure natural gas deposit was struck in the depth of 2,500 meters. This is the first important discovery of natural gas in Czechoslovakia. [Text] [Bratislava PRACA in Slovak 4 Oct 80 p 9]

NEW DICALCIUM PHOSPHATE PLANT--Construction of a Soviet-designed dicalcium phosphate plant began on grounds of FOSFA plant in Breclav-Postorna. The plant expects to produce annually 50,000 tons of this important livestock nutrient. This figure will double the current yearly tonnage of dicalcium phosphate imported by the CSSR from the West, resulting in savings of Kcs 220 million in hard currencies annually. [Text] [Prague SVOBODNE SLOVO in Czech 3 Oct 80 p 4]

FIELD MOUSE OUTBREAK--Aerial application of highly effective pesticide preparation "Stutox" began in the South Moravian districts of Trebic, Brno, Vyskov and Prostejov, to exterminate this year's overpopulation of field mice. According to the Experimental Ecology Department of the Research Institute of Vertebrates in Studenec, yearly damage by field mice to Czechoslovak fodder cultivations amounts to between Kcs 150-250 million. [Text] [Prague LIDOVA DEMOCRACIE in Czech 2 Oct 80 p 4]

NATURAL GAS STORAGE IN MINES--The empty shafts of the "25 February Mine" in Bohutin, in which mining for lead, silver, antimony and zinc has been completed, will be used for storage of tens of millions cubic meters of natural gas. This will enable surplus gas from the summer to be stored for peak consumption in the winter. [Text] [Prague PRACE in Czech 2 Oct 80 p 3]

CSO: 2402

HEAD OF COMPUTER TECHNOLOGY APPLICATIONS DEVELOPING SOCIETY INTERVIEWED

Budapest SZAMITASTECHNIKA in Hungarian Jul-Aug 80 p 3

[Interview with Dr Matyas Arato, chairman of the managing council of the Computer Technology Applications Development Society [SZAT] and manager of SZAMKI (Computer Technology Training Center) by Dr Ivan Szabo in early July]

[Text] As we already briefly informed our readers in our June issue, the responsible managers of 17 computer technology institutes announced on 22 May under their signature their intention to establish as a research development society the SZAT and their intention to cooperate in its work in the future.

[Question] What were the reasons for establishing the SZAT? What are the specific goals of the society in the coming years?

[Answer] The establishment of the SZAT was preceded by long preparatory work, the coordination of which was carried out by the so-called Subjects Committee of the Basic Institutes. The inadequacy of basic domestic software supplies and the lack of unified application software in enterprise applications were the basic causes which stimulated the Basic Institutes to make joint efforts toward ending the insufficiencies. In recognizing the domestic demands, we started out by recognizing the fact that despite the inadequacies, a given institute could still survive for a long time, but could not realize a significant advance in the field of software supply without close cooperation. To this end, it is necessary to set forth exactly every partial task for determining the national tasks as a whole and determining the further development and pursuit of software products already under development.

Basically, these will be the most specific goals of the society in the coming years.

[Question] What kind of means will the society have to realize the goals? Central financing is the essential basis of its cooperation. Is it not conceivable that on the basis of joint risk undertaking and appropriate sharing of results they will work out specific subjects?

[Answer] Every member of the society has significant, although heterogenous, means for the realization of its goals. Similarly significant are the human resources. In the solution of central financing application tasks, the society wishes to operate as the base. Contributing to this end, and now under development, is the making of those software products which the institutions would carry out through joint risktaking in addition to central financing. Here I would like to emphasize the formation of application program systems--I am thinking primarily of recording, managing and guidance systems--into products, the maintenance, development and system economy of which would be undertaken by a given institution of the society.

[Question] In your judgment how interested are the individual institutes which are massed in the society in participating in standardization work and in the introduction of standards?

[Answer] The institutes of the society are not only interested in standardization work, but also demand the introduction of standards and their prescription in organization, programming and documentation. A significant share of the institutions do not have adequate resources to participate in all standardization work, but everyone demands and urges the introduction of standards.

[Question] According to the contract the members of the society are to set up joint training forms. Do they desire to use in this work the possibilities offered by SZAMOK [Computer Technology Training Center], the basic training institution of Hungarian computer technology?

When in the field of standardization/unification the common results of the society will be established, training work can contribute greatly to their dissemination. In fact, it is hardly conceivable that training can stand on any other basis. Therefore, it is very important to maintain relations with SZAMOK and other training institutions, first at an information level and later on a broader basis, or in a system. What is your view on this group of questions?

[Answer] The members of the society seek to receive experiences and transmit information, which also includes the development of certain training forms. Such forms may consist of joint programs and seminars. In addition, we also wish to take advantage of those possibilities which SZAMOK offers at a high level. The possibilities for developing closer ties with SZAMOK is implicit in the question itself, and as for myself I agree with it in a far-reaching manner.

[Question] Could the information and orientation tasks of the society be helped in the application of computer technology by the information activity of SZAMOK, the basic library, the BABILON interactive retrieval system, and periodical and book publication (particularly in researching successful problem solutions, analyzing and adapting them). How do you judge their role in the realization of goals?

[Answer] The role of SZAMOK's information activity and of the basic library can be further developed by linking the library services of the member institutions to the basic library services of SZAMOK. In this way computer processing can be made more rapid and efficient, in which SZAMKI on its own behalf earlier reported it was joining. I am convinced that not only the library services of the institutes that are joining, but also those already participating will gain a great deal from central records.

[Question] In the present economic situation it is particularly important that the interested institutions and enterprises should carry out their computer technology application activity in rational professional distribution, as was pointed out already by Lajos Pesti, deputy chairman of the KSH [Central Statistical Office] at the 22 May founding session.

The emphasis should be directed toward responsible work distribution, something to which the government is also devoting a great deal of attention. What kind of results are you expecting from the society in this area?

[Answer] We see rational work distribution not only in the coordination of plans and the discussion of reports, but also in the solution of such large-scale tasks as the institutions cannot undertake separately. I am thinking here on the making of such a program product system on the five-unit terminal ESZR computers as is shown in the case of IBM by the PICS, or the COPICS, naturally proceeding from domestic demands, conditions and possibilities.

[Question] Please name several kinds of tasks which according to the provisions of the contract the society, in event of demand, performs for the preparation of upper-level decisions. What specific tasks do you do for SZAT?

[Answer] The basic institutes desire to evaluate that part of the Sixth Five-Year Plan which deals with enterprise applications as well as the enterprise application, software technology, software supply tasks of OKKFT (National Medium-Range Research Development Plan). The institutes not only have experience but the resources necessary for the solutions.

[Question] How much will this unity help in supplying the computer with effective software and thereby make general the application of modern computers?

[Answer] The unity of the basic institutes assures possibility for the effective circulation of good solutions, for seeking economic solutions, and also provides the forms and boundaries of typification and standardization.

[Question] Please explain in more detail what you mean by the provisions in point one of the contract according to which in case of a sufficient number of applicants they will examine the possibilities of software service and in the hardware area the possibility of establishing a common base?

[Answer] All of the institutes which have the same computer pool also have their own hardware or software service. In the case of the basic institutes there is hardly any example of the use of the NOTO OSZV service. Without seeking to evaluate the work of the NOTO OSZV, I can assuredly announce that the service experts of the institutes wish to be over the NOTO OSZ services. Bringing these to a common basis would result in enormous savings if everyone wants this and naturally if the reliability level of the computers reaches a certain level.

[Question] In realizing the goals set forth in the society's contract, how does the NOTO OSZ fit in? What are the special tasks of the OSZV and the tasks specially referring to the members of the society's contract? Are these tasks different from the national tasks of the NOTO OSZV?

[Answer] In the answer to the previous question we already spoke of the NOTO OSZV, whose work the basic institutes wish to support, and they too demand a higher level of OSZV services. This development can only be the result of a longer process, but the goal is obvious and clear.

6691
CSO: 2502

COMPUTER PROGRAMS FOR STUDENTS, GRADUATES OF CHEMICAL ENGINEERING

Budapest NEPSZABADSAG in Hungarian 4 Oct 80 p 6

[Excerpts] In the fall of this year a scientific conference entitled "Chemplant 80" was held in Keszthely, Hungary. The international conference was arranged at the request of the Federation of European Chemical Engineers by the Hungarian Chemical Association in collaboration with the computer work group of the Czech Chemical Association. The conference dealt with the use of computers in the planning and establishment of chemical plants. Widespread interest in the topic was revealed by the fact that one of the lectures was delivered by a specialist from the United States.

Hungary has developed two computer packages devoted to this field under the names of Chemisys and Forsim. Chemisys is known professionally as an organizing program, because it ties together the programs designed for teaching various other subjects. Besides being a computer program itself, Chemisys serves as guide for writing the other programs: it contains directions which unify the work. The University Computer Center which has and continues to coordinate the working out of the programs informs the various computer training centers about availability of new programs and sends them copies. Preparation of the data basis and establishment of the program library for Chemsys was the work of six institutions: the University Computer Center, the department of applied chemistry of the Attila Jozsef University of Sciences in Szeged, and the faculties of chemical technology, chemical operations, general and analytical chemistry, chemical industry machines and agricultural industries of Budapest Technical University. At present, not all universities have computer centers, but all have free access to the computer network of the Ministry of Culture for teaching purposes. This ministry is currently establishing a nationwide computer center network. Other institutions in other cities will eventually have access to the network through terminals.

The first seven textbooks which are to be used in conjunction with Chemisys as a teaching aid have already gone to press. The work involved in preparing said books was performed as government commissioned research the funding for which was voted 2 years ago by the government's Science Policy Committee.

The computer assisted teaching and simulating system known as Forsim is an important part of Chemisys. With the aid of Forsim, university students can learn to control or solve process regulating problems through simulation in a so-called "dry laboratory."

CSO: 2502

UTILIZATION OF MPS-7541 CALCULATOR INTEGRATED CIRCUIT

Budapest HIRADASTECHNIKA in Hungarian Vol 31 No 8, 1980, pp 294-296

SOBKOWIAK, RYSZARD, Dr., Polytechnic of Poznan, Automation Institute

[Abstract] The MPS-7541 calculator integrated circuit, originally developed for pocket calculators, was examined with the aim of finding new utilizations for it, specifically to use it to form reciprocals for period-measuring frequency meters. A circuit was developed which operates the integrated circuit with a synchronous control device feeding logic "1" signal to the Y1 input if a number is fed to the memory and to the Y2 and Y3 inputs if an operational code is entered. With the aid of this modification the MPS-7541 becomes capable of forming reciprocals. This capability is used in frequency measurements in the low-frequency range where inaccuracies are often encountered because of the fact that only a small number of frequencies can be measured within a practicable measuring time with conventional frequency meters. Once, through reciprocal formation, period times rather than frequencies are measured, the measuring time can be significantly shortened without sacrificing accuracy. The MPS-7541 is particularly suitable for this purpose since it requires a service voltage of +5 V, so that it can be operated from the same supply as the TTL components. The system developed can be readily modified to provide printout. Multiple programming is also feasible with larger-capacity memories. Figures 3, no references.

2542
CSO: 2502

BRIEFS

VILATI MODULES--Many different kinds of guiding systems, from machine tool control to astronomical telescopes, can be built from 30 unified industrial-electronic elements, the manufacture of which has been started by VILATI (Institute of Electrical Automation). With the development of modular industrial-electronic systems, the manufacture of automated equipment has become more economical. The unified modules make it possible to manufacture equipment in large runs that can be warehoused as well as different kinds of single pieces of equipment. The number of built-in parts for controls developed with unified modules has declined to one-third of what it was before and compared to traditional equipment for similar purposes it requires about one half the energy. Computers from modules made at the Electrical Automation Primary Contracting and Manufacturing Enterprise, and supplemented with unified industrial module elements are suitable for carrying out much more complex tasks than heretofore. When the technology is changed--without transformation--the system can be reprogrammed at any time. [Text] [Budapest SZAMITASTECHNIKA in Hungarian Jul-Aug 80 p 3] 6691

CSO: 2502

BRIEFS

REPLACING COMPUTERS WITH MICROCONTROLLERS--A prototype microcontroller was exhibited for the first time in Poland at the Poznan International Fair. It was developed at the research and development center of the "Mera" Automation Systems Plants in Poznan. The microcontroller looks like an ordinary box which contains printed circuit boards and large-scale integrated circuits. Each board is capable of controlling a certain section of production. After appropriate programming, a single microcontroller is capable of controlling other microcontrollers and producing the appropriate reaction for conducting the production process. Microcontrollers may be used whereever computers are either unprofitable or unnecessary and whenever it is necessary to collect, process and analyze data related to controlling production flowlines. It is very likely that the first microcontrollers will replace, in 1980, the computer used for electrolysis at the "Konin" Aluminum Plant and subsequently will be used in the production of light bulbs at the "Polam" plants in Pila and at the warehouse of the Kasprzak Plants in Warsaw. The "Mera" Automation Systems Plants in Poznan intend to begin series production in 1981. [Excerpts] [Warsaw KURIER POLSKI in Polish 18 Aug 80 p 2]

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JPRS 76852

21 November 1980

East Europe Report

SCIENTIFIC AFFAIRS

No. 687

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JPRS 76859

21 November 1980

EAST EUROPE REPORT

SCIENTIFIC AFFAIRS

No. 687

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POLISH-HUNGARIAN RELATIONS IN COMPUTER TECHNOLOGY

Budapest SZAMITASTECHNIKA in Hungarian Jul-Aug 80 p 18

[Text] The Polish-Hungarian relations in computer technology have a background of more than a decade. The appearance of the second-generation ODRA's in Hungary may be considered the beginning of the cooperation. But it was the ESR program that resulted in a more significant progress. Of the Polish tasks in the ESR, the R30 class, medium-capacity computer--developed jointly with the USSR--may be pointed out as an equipment which is continually available to domestic users from socialist imports. True, the Soviet Union also exports this class, but the Polish-made R32 models, the so-called "complete automatized control systems connected to institutions," which solve concrete and individual problems on the users, cannot be substituted by anything else in the domestic plans of use.

Most of the periferials needed to make the systems complete are developed and manufactured by the Poles themselves and are only partly dependent on the products of other socialist countries. The change to magnetic tape and soft disc technology that followed the punch card technology, for instance, was successful. The mosaics presser is also noteworthy which is outstanding in its class alongside with the line presser which is comparable in price and performance to mid-size computers but has a higher output. The development and manufacture of displays has also reached a level adequate for meeting demand. According to the newest informations, the manufacture of a high-capacity (100 Mbytes and larger) magnetic disc storage is also being planned.

The list would not be complete without mentioning the array of long-distance data processing equipment and systems, which were designed on the basis of the PDR's communications industry and which are mass produced today. The Polish partner demonstrated to Hungarian specialists in February 1980 how the "TELE-JS" subsystem operates, which consists of a central unit of 1-MByte operative memory (ES 2032), a local display system (ES 7190), a 16-channel long-distance data processor with a 48-KByte operative memory (ES 83 7101), start/stop terminals (ES 8575), and a synchronized terminal system containing groups and individual displays. Our partner achieved significant results in developing the RJAD-2 long-distance data processing system. In essence, they mass produce models belonging to every speed category. In addition, they also manufacture press terminals on the basis of a SAAB license, and video terminals on the basis of a LOGABAX license. Among the socialist countries, it is primarily the Polish industry which manufactures long-distance data processors.

Similarly to its partners, the PDR began developing in the manufacture of MSR equipment a structure which is close to its profile already existing in the ESR and which, together with the developments of the ES II and III—also built on the existing structure—we are not going to describe in detail now.

The reader is familiar with the development and product structure of the Hungarian ESR and MSR computer technology. In comparing that with the Polish computer technological profile outlined above, it is apparent that both countries have a similar task in the multilateral cooperation. A closer scrutiny will also reveal significant differences between our computer technological equipment, such as, for example, the performance, use and specifications of our ESR computers or our line presser placed between the peripherials or our fixed disc between the storages, and in some cases even the production technologies are significantly different. Both the similarities and differences in our countries' existing computer technological production profiles have possibilities for further cooperation, development, cooperation in production, and specialization.

It is also known that scientific and technical product and production activity, the preparation, implementation and control of barter, the finding of possibilities for specialization and cooperation etc. are included in the main tasks of bilateral cooperation between our ministries and the similar ministries of other socialist countries.

Aside from the tasks and requirements of multilateral international cooperation, the domestic industrial developmental goals and possibilities, and the attempt to reach the goals determined earlier by the Computer Technological Central Developmental Program determine the character of computer technological cooperation in a given relation.

As an example, let us look at some concrete industrial developmental goals and let us examine them from the aspect of the Polish-Hungarian cooperation: it is the domestic industry's task to play an increasing role in meeting the demands of the domestic users.

In cooperating with the PDR, this means that

—the domestic user's demand for selection can be better met (e.g., R-32 computer, up-to-date system of data collecting and data preparation, AIR and long-distance data processing AIR's),

—the improvement of the technical quality of the product structure is suitable for re-establishing the balance in barter,

—our products included in the cooperation are suitable for import compensation,

—the improvement of our production can be realized through a better use of our existing capacities.

The existing capacities and the existing product structure may be the bases of cooperation or labor division and specialization. Such is, for example, the display the development and production of which has been manufactured in both countries for a long time in economical quantities, and probably will continue to be manufactured in the near and more distant future.

As a result of the actually existing objective possibilities and limitations of cooperation, we have achieved significant results in the past 10 years. Our annual trade in computer technology exceeds 12 million rubles. Part of the trade reaches the consumers directly, but a significant part consists, indirectly, of the peripherials necessary for completing our systems (mosaics presser, e.g., DZM 180) and of partial units (keyboard ES 0101), i.e., they can be considered as actual parts of the industrial cooperation.

In the branch of Polish-Hungarian computer technology, an agreement was made to make preparations for a longer-term bilateral computer technological pact which will be signed by industrial and foreign trade enterprises. From the Hungarian side, the persons authorized to make preparations and to sign are, under the responsibility of the City Council RT [expansion unknown], the BUDAVOX and the METRIMPEX; from the Polish side it is the MERA Association.

In the coming years we will increase the mutually advantageous trade in computer technology and will improve the composition of products that serve as barter. In the complete system, we will take great care to engage and systematize each other's subsystems and partial units, thereby also trying to find possibilities for the expansion of specialization and cooperation.

9414
CSO: 2502

BRIEFS

GIANT LATHES FOR USSR--Czechoslovakia will deliver two SUT 205 D lathes to the Soviet shipbuilding industry in the beginning of the Seventh Five-Year Plan [1981-85]. The contract worth about Kcs 80 million was signed between CSSR's STROJIMPORT and USSR's STANKOIMPORT enterprise. The lathes produced by the SKODA enterprise in Plzen have a turning diameter of 2,050 mm and a 50-meter long lathe bed. [Prague MLADA FRONTA in Czech 22 Oct 80 p 7]

CSO: 2402

BULGARIA

DEVELOPMENT OF MICROELECTRONICS OUTLINED

Statement by First Deputy Minister

Sofia RADIO TELEVIZIYA ELEKTRONIKA in Bulgarian No 6, 1980 pp 2, 3

[Article by Engr P. Kis'ov, First Deputy Minister of Electronics and Electrical Engineering: "The Accelerated Development of Microelectronics--A Strategic Area in the National Economy"]

[Text] The 11th BCP Congress, the National Party Conference and the Plenum of the BCP Central Committee concerned with the accelerated development of certain strategic areas in scientific and technical progress in Bulgaria have outlined the ways and means for sharply improving the quality and efficiency of the economy. A significant share in carrying out this strategic task has been allotted to the introduction of electronics in the national economy and social life by the broad introduction of the top achievements in electronics and microelectronics.

The Party Central Committee, the Politburo and Comrade Todor Zhivkov personally have always devoted great attention to the development of our microelectronics industry, as a strategic subsector of the national economy. In his speech before the National Conference of 31 October 1979, Comrade Zhivkov ranked the accelerated development of microelectronics as one of the prime tasks for the intellectualization of social production during the Eighth Five-Year Plan.

The collectives involved in the development and production of semiconductor devices and integrated circuits are beginning to carry out this strategic directive with full mobilization and an increased feeling of responsibility. The scientific, production and technological potential are grouped in several basic areas.

In the area of MOS technology, efforts have been focused primarily on the permanent and working memories (static and dynamic), specialized MOS circuits, universal logical circuits, calculator circuits, and the SM 600 microprocessor family.

Static working memories with a capacity of 1K and a family of 4K dynamic working memories are the input into mass production. A family of dynamic working memories with a capacity of 16K, 64K and so forth are to be developed. During the Eighth Five-Year Plan the increase in the production of working memories will be over 3-fold. The degree of integration will rise by many-fold and in parallel with this the functional complexity of the produced memories will rise.

Microprocessor circuits will be rapidly developed, with the organizing of mass production for 8- and 16-digit microprocessor sets. The production of microprocessor sets in the Eighth Five-Year Plan will rise by many-fold. The development of a single-chip microcomputer will be realized.

Bipolar technology will be developed as the second most important area in our microelectronics. The basic efforts will be focused on the development and production of interface circuits, and later also large bipolar circuits and analog circuits for industrial use. During the following five-year plan their production will grow significantly.

Hybrid integrated circuits will be developed as an independent area in microelectronics. Basic efforts will be focused on the development of thin-layer hybrid circuits for radiotelephony, digital-to-analog and analog-to-digital converters, and so forth. A significant portion of the hybrid circuits planned for production will be used in industrial-end articles. During the Eighth Five-Year Plan the growth of hybrid circuits is to be around 3-fold, with a sharp increase in their functional capabilities, and this will fully satisfy the domestic needs of the nation.

Greater attention is also being paid to the traditional discrete semiconductor devices chiefly in two aspects: improving the quality, output and reliability of the range of silicon planar epitaxial devices produced in Bulgaria and broadening the range of low- and medium-power transistors, and the development of a new area, that of high-powered silicon planar epitaxial transistors.

Activities are to be increased in the area of optical electronic devices (light diodes, light displays, phototransistors, optrons, and so forth). The main efforts are focused on optrons with improved basic performance, namely: the K current transfer constant and speed.

The planned development of the individual areas of integrated circuits and discrete semiconductor devices will cover a significant portion of the nation's requirements by local production, and will allow us to carry out reciprocal exchange in this area with the CEMA member countries, and particularly with the USSR. On the basis of the developed microelectronic elements, production will be organized for such important microcomputer systems as the data processing microcomputer system, the IZOT 0250, the device for preparing data for a floppy magnetic disc, the IZOT 8500 digital terminal, the IZOT 7925 video terminal, the IZOT 8531-01 dialog terminal, the IZOT 1002S test processor, the IZOT 1001S pass system, and others.

The high production growth, the qualitative changes in the functional capabilities of the basic product groups and the tasks of technical progress will be achieved by introducing new production capacity, by expanding and reconstructing the existing, as well as by partial new construction.

However the carrying out of the National Comprehensive Program for the introduction of electronics in the national economy and social life depends most upon living human potential operating directly in this area, upon its technical skills, its political and labor activeness.

The experience acquired during the last 15 years and the repeatedly shown high capabilities of the collectives at the Botevgrad Scientific-Production Combine for Semiconductor Equipment are a good guarantee for the success of this noble and highly patriotic undertaking.

Statement by Plant Manager

Sofia RADIO TELEVIZIYA ELEKTRONIKA in Bulgarian No 6, 1980 pp 3, 4

[Article by Engr Marin Marinov, Director-in-Chief of the Botevgrad Scientific-Production Economic Combine for Semiconductor Equipment: "Semiconductor Equipment--The Basis for the Introduction of Electronics into the National Economy and Social Life"]

[Text] After the historic April Plenum, the BCP Central Committee has constantly devoted attention and taken enormous care for the development of semiconductor microelectronics, as one of the most important subsectors and agent of technical progress in the national economy. Due to this and because of the fraternal help of the Soviet Union, our nation is rapidly developing a modern electronics and electrical engineering industry, and this is having a growing impact on improving the structure and raising the efficiency of the national economy.

The 11th BCP Congress posed responsible tasks for the semiconductor industry in implementing the strategic motto for high quality and high efficiency. For carrying out these tasks, under the leadership of Comrade Todor Zhivkov, a national comprehensive program has been worked out for the introduction of electronics in the national economy and social life. This program has been approved by the Politburo of the BCP Central Committee and the Council of Ministers.

The National Party Conference and the plenum of the BCP Central Committee for the accelerated development of certain strategic areas of scientific and technical progress confronted the sector with new, more responsible tasks in the area of raising the technical and economic level and realizing the top achievements in certain areas of electronics and electrical engineering.

For carrying out the party decisions, there have been a thorough analysis and implementation of the ideas concerning the development of semiconductor equipment in our country. The chief positions have been clarified for the development of the scientific-technical and production potential of semiconductor microelectronics. These are:

1) A substantial improvement in the quality and economic effectiveness of the traditionally produced semiconductor devices and integrated circuits;

2) A greater reliability of the produced discrete semiconductor devices and integrated circuits;

3) Developing qualitatively new production methods and products.

The scientific-technical and production activities of the combine in 1980 and in the near future are determined primarily by the requirements of the domestic and international market, and are in full accord with the current trends in the development of this undoubtedly most dynamic subsector of electronics. In this regard, the activities of the combine are shaped by certain chief directions:

1) The MOS integrated circuits: circuits of the 400 and 500 series; permanent memories (the 7000 series); working memories--static and dynamic (8000 series); circuits for telephone equipment (the 900 series); time meters (the 200 series); the 8-bit universal microprocessor system with large input and output capabilities and a memory capacity of 64 kilobits (the 600 series); logical circuits; circuits for electronic calculators, and so forth. In the next few years there are plans to begin production of dynamic, permanent and working memories with a capacity up to 16 and 64 kilobits;

2) Bipolar integrated circuits: the 1US709, 1US709S, 1U0741 and 1U0741S operational amplifiers; 1SA710, 1SA710S voltage comparators; the 1U0101, 1U0201, 1U0101A, 1U0201A and 1U0301A operational amplifiers; interface circuits; voltage stabilizers, and so forth;

3) Optical electronic devices: light diodes with an emitted wave length of 800-1,000 nm (3E1001); optical connected insulators or optrons (6N2112, 6N2001 and 6N2017); phototransistors (2F2101, 2F2102 and 2F2062);

4) Discrete semiconductor devices: silicon diodes with a voltage up to 1,200 volts and a current up to 25 A; silicon planar epitaxial transistors with a boundary frequency f_T to 300 MHz and a dispersed collector power from 8 to 60 W; medium- and high-powered high frequency transistors; UHF transistors; rectifier diodes; transistors to 15 A, and so forth;

5) Hybrid integrated equipment: a range of resistive groups; delay lines; entire hybrid electronic assemblies.

During the period of the Eighth Five-Year Plan, microelectronic elements will undergo very strong development and will have a direct influence on the cost of the products of the electronic equipment.

In parallel with this, the combine is developing ever closer ties with the countries of the socialist camp and primarily with the USSR. Particularly valuable and helpful has been the aid provided to us by specialists from the enterprises of the USSR Ministry of Electronics Industry.

For the collective of the combine the 15th anniversary of Bulgaria's semiconductor industry is not only a cherished holiday, but also the proper grounds for reflecting and assessing our place and our responsibility for the accelerated development of Bulgarian microelectronics. More than 80 enterprises in our country and abroad each year state their high requirements for us. Our product is the basis for such important subsectors as computer and office equipment, automation and instrument building, radio and television equipment and others related to the introduction of electronics in the national economy and social life. And as was emphasized by

Comrade Todor Zhivkov in his speech in the opening of the Semiconductor Instrument Plant on 28 April 1965: "...At present it is inconceivable to have technical progress which is an area of both material production and human life, without most widely employing the capabilities of radioelectronics and cybernetics.... Electronics and cybernetics under the conditions of communism make human labor more creative and highly productive, they provide an opportunity to organically combine mental and physical labor...."

All of this sets out the development path for the combine and poses major and responsible tasks for its collective.

10272
CSO: 2202

SPECIFICATIONS OF MOS INTEGRATED CIRCUIT FOR TOUCH PHONE

Sofia RADIO TELEVIZIYA ELEKTRONIKA in Bulgarian No 6, 1980 back cover

[Advertisement for the SM 913-1 MOS Integrated Circuit for the Touch Telephone]

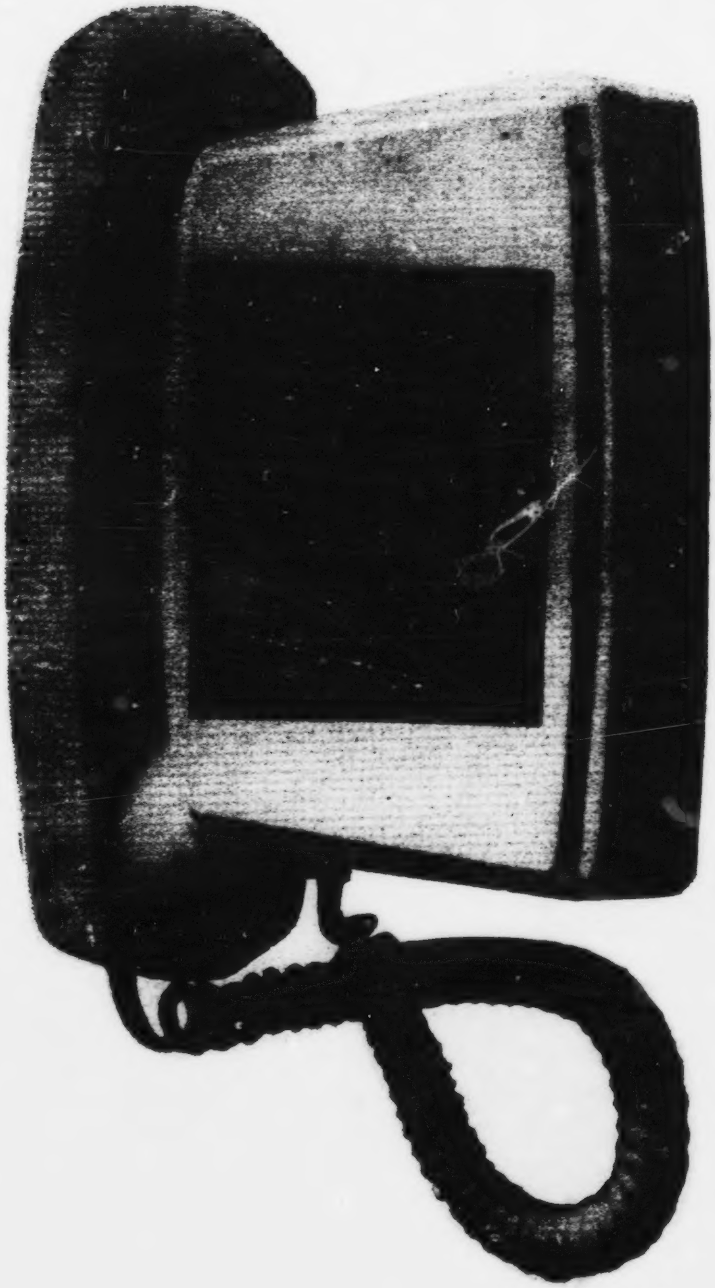
[Text] The SM 913-1 MOS integrated circuit performs all logical functions for converting the action of the keyboard into standard pulse series. There is the possibility of changing the pulse frequency, the pulse ratio and the interseries pause. The circuit provides for the repeating of the last dialed number. It is installed in a 42-terminal DIP 2.5 plastic housing.

Basic parameters

Memory capacity	20 digits
Pulse frequency	10, 20 pulse per second
Pulse ratio	1.6:1, 1.5:1
Interseries pause	800, 1,000 ms
Operating frequency	2 kHz
Power voltage	-5 -- -7 V
Consumed power	2 mA

Producer: Botevgrad Scientific Production Economic Combine for Semiconductor Equipment

Exporter: Izotimpeks VTO



10272
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CZECHOSLOVAKIA

BRIEFS

NEW NATURAL GAS STORAGE--The Brno Research Institute for Geological Engineering will convert a depleted coal mine near Pribor, North Moravia, into a natural gas storage. The gas will come from the natural gas deposits in South Moravia. The first stage of construction will enable storage of 180 million cubic meters of natural gas in the mine, of which 2 million will be delivered daily to consumers. Recently work began on another similar project located in Hrusky, Breclav District. [Bratislava PRACA in Slovak 18 Oct 80 p 9]

CSO: 2402

COUNTRY'S ROLE IN COMPUTER TRADE VIEWED

Budapest KULGAZDASAG in Hungarian No 8, 1980 pp 61-63

[Article by Nandor Balogh, engineer-economist, member of the Computer Service of the National Administration: "Hungary's Role in World Computer Trade"]

[Excerpt] Hungary is at the third of the six levels in the model system (CIDP index) arrived at by the UN and further developed by others to measure the state of computerization in individual countries. The starting point for the model is economic, technological, and cultural development and the interrelationship and mutual effects of the state of computerization. Accordingly, our computerization is essentially adequate but remains below the state of our development. In 1977, 521 general-purpose computers were installed in Hungary. This amounts to 0.07 percent of the general-purpose computers (CPU) in the world. In respect to the specific number of units (calculated by computers per million of population (47 units) Hungary is somewhat below the world average but above the average for socialist countries, and the same can be said of the percentage value of the installed machine pools as compared to the GNP. The Computer Technology Central Development Program introduced in Hungary in 1971 on the basis of the ESZR [Uniform Computer Technology System] raised—despite the existing problems—the level of our computerization within the above-named model system in the 1970's by at least one full level. Regarding a computer pool like this of relatively small total value, conclusions regarding foreign trade should be made only carefully since the acquisition of a large computer or two will substantially modify the ratios, particularly in an annual breakdown. Twenty-three percent of our general-purpose computers are of Hungarian manufacture, 38 percent socialist, and likewise 38 percent capitalist. Fifty-eight percent of our mini-microcomputers are of Hungarian manufacture, 14 percent socialist, and 31 percent capitalist. General-purpose computers of Hungarian origin are the small computers manufactured on the basis of capitalist license by VIDEOTON and KFKI [Central Research Institute of Physics], while those of capitalist origin are in general medium and high performance computers. Our largest manufacturer makes small computers in accordance with VIDEOTON and ESZR specialization. Electronic Data Processing (VT Computer Technology Factory) receipts are still below other receipts (for radio and TV) but the ratio increased dynamically in the 1970's. The bulk of EDP receipts derive from exports; its largest commercial and service branches are in the Soviet Union and GDR, but its activities are also being increased in the FRG, where it markets through a mixed enterprise. It has longstanding ties with France deriving from license purchases. In the near future it would like to reorganize its information system into a computerized network. The bulk of socialist imports come from the Soviet Union and the GDR; in the case of capitalist imports the country of origin is less important than the manufacturer because in principle the large firms can sell the same product from a number of countries. Here our main suppliers are IBM, Siemens, CII-HB and ICL, although the role of Japan is also increasing in our computer technology. It should be noted that before granting an import license--unlike with the purchase of other commodities--the coordination of local and national economic interests is carried out by the Computer Technology Application Committees or the Computer Technology Interministerial Committee (for example, from the viewpoint of software compatibility and applicability in teledata processing systems). The custom duties for computer technology equipment in capitalist trade is uniformly 20 percent.

Table. Foreign Trade Direction of Hungarian Computer Technology Products (SITC 75) in the Second Half of the 1970's
(in million forints)

Countries (regions)	Imports 1976	Imports 1977	Imports 1978	Exports 1976	Exports 1977	Exports 1978
Socialist countries	1859.6	2265.7	2402.7	3101.5	3619.2	3942.0
CEMA	1856.0	2262.8	2399.3	3039.7	3555.3	3843.3
Nonsocialist countries						
Developed capitalist	1068.4	1591.4	1958.6	184.5	193.0	401.7
European Economic Community	505.5	836.9	1090.0	71.1	50.0	153.0
Other European	319.6	394.3	311.1	113.3	136.0	219.5
Outside of Europe	243.3	360.2	584.6	0.2	7.0	29.1
Developing countries	16.9	10.9	0.1	3.3	13.2	10.2
Total*	2944.8	3868.0	4388.4	3289.3	3825.4	4353.9

* In million dollars: 66.6; 94.5; 115.2; 74.4; 93.5; 114.3
Source: Foreign Trade Statistical Yearbook 1978

Our foreign trade in computers increased dynamically in the first half of the 1970's. Our imports grew annually on an average of 63 percent (imports had a decisive role in the increase in specific indexes); in 1976 it declined somewhat, but even so it represented 0.74 percent of world import, which is one magnitude greater than our weight in computer stock. Thus Hungary is joining intensively in international work specialization; our balance was negative in the first half of the 1970's, but then it became evened out.

Both exports and imports increased significantly, the latter, however, by no means as in previous years but at a declining rate; with exports this trend was milder in extent. In trade with socialist countries our balance is strongly positive while in trade with the developed capitalist countries it is even more strongly negative, and in case of the latter our commodity structure is also more unfavorable. The bulk of our socialist exports went primarily to the ESZR member countries, the Soviet Union and the CSSR. At the same time the importance of the EEC countries (the FRG and France) also increased, and this can also be observed in our trade with the other developed capitalist countries (Switzerland

and Sweden). In our imports, the socialist countries (Soviet Union and GDR) had the major role, although their ratio fell from 63 to 55 percent. The ratio of our EEC imports (from the FRG, France and Great Britain) on the other hand increased from 17 to 25 percent, while from other European countries (Sweden, Switzerland, Austria) imports declined from 11 to 7 percent. Our imports from developed capitalist countries outside of Europe (Japan and the United States) rose from 8 to 13 percent, while they declined from the developing countries (India, Hong Kong).

In respect to our commodity structure, the small (though growing) ratio of peripheral products is striking. The ratio of the large, general-purpose data processing computers was 53 to 63 percent, of small computers 2 to 7 percent, while of peripheral products it rose from 13 to 24 percent. In our exports the ratio of calculators is between 3.5 to 6.2 percent, of small computers between 78 to 87 percent, while the ratio of peripheral products fluctuated between 10 to 16 percent. In the case of calculators, our balance is negative, but in accordance with our specialization it is strongly active for small computers (we have only imports in the large computers since we do not manufacture these domestically), and in the case of peripheral products it is even.

With the second half of the 1970's the growth rate of specific indexes of our computerization declined somewhat, primarily as a result of a moderation in imports. Nowadays the emphasis in Hungary too--as in the developed capitalist countries--is shifting in the direction of teledata processing. A more vigorous development of such systems is also for us the course to be followed (but in harmony with our possibilities) because among other things it makes possible a more effective utilization of existing computers. The realization of a macro-level concept serving this goal and prepared with the participation of all the interested parties (computer technology and telecommunications manufacturers, appliers, and researchers) will make its influence felt in the 1980's in our information systems. Our teledata processing systems which are under development are for now being built mostly on capitalist computers (the applicability of the small computers which we manufacture is in part solved and in part underway), but it can be expected that soon the large ESZR computers will appear in or expand further our teledata processing systems.

6691
CSO: 2502

MEMORY OF ES 1022 COMPUTERS EXPANDED

Budapest SZAMITASTECHNIKA in Hungarian No 9, Sep 80 p 1

[Text] Over 100 imported Ryad computers were in operation in Hungary in 1979. Most of these, over 40 percent of ES imports, consisted of ES 1022 systems. The efficiency of these systems is proved by the favorable experiences of those who operate them. However, the scope of tasks to be processed has been increasing steadily, and sooner or later those using the ES 1022 encounter limits in the resources available to them through the system. Purchase of larger computers will be restricted to cases of dire necessity because of the limited investment possibilities provided by the Sixth Five-Year Plan. Therefore the recommended procedure is to expand the capacity of the ES 1022 computer and to improve its efficiency.

One way of doing this is through use of an up-to-date operating system (OS). A basic condition for use the OS system is an operational memory of at least 512 Kbytes. However, very few ES 1022 configurations have a storage capacity of this size.

After recognizing the problem - and to increase the reliability of the memory - the Technical Department of NIM IGUSZI [Ministry of Heavy Industry Institute of Industrial Economics and Systems Analysis] developed a semiconducter memory which is fully compatible with the ES 3222 ferrite memory. Furthermore, by exchanging some printed circuit boards, they made it possible for the CPU of the ES 1022 to handle a 1Mbyte memory so that the configuration can be expanded to 1Mbytes through 256 Kbyte increments.

The LABOR Instrument Industry Works is already producing the semiconductor memory and the first models will be put on the market by the National Computer Technology Enterprise in the course of this year.

CSO: 2502

HUNGARY

POTENTIAL OF TECHNICAL INTELLECTUALS UNREALIZED, UNREWARDED

Budapest NEPSZABADSAG in Hungarian 7 Oct 80 p 3

[Interview with Dr Janos Toth, first secretary of the Federation of Technical and Scientific Associations, by Mihaly Tamas. Date and place not given]

[Text] The Federation of Technical and Scientific Associations [MTESZ] has 170,000 members. It joins the intelligentsia into thirty-two associations, which encompass all areas from mining to construction industry, and from communications to mathematics. We had a discussion with Dr Janos Toth, the federation's first secretary on the conditions and goals of the technical and agrotechnical intelligentsia.

Only a Fragment

[Question] In your view, what is the significance and role of the association? And with what problems have the members of the MTESZ concerned themselves lately?

[Answer] Last year a million and a half experts participated in the 28,000 events sponsored by the associations. Among others, we discussed questions such as the economical utilization of energy and of raw materials, the problems of our electronics industry, the situation of the pharmaceutical industry, and the development of the industrial base of agriculture. Many debates have taken place--and are still continuing--on these questions. These meetings have resulted in many useful ideas, observations and propositions. The greatest significance of the MTESZ lies in the fact that it unifies and brings together to a single table the authorities of the most diverse fields. By stepping across the boundaries of the fields of specialization, of bureaucratic offices, and of county borders, it is able to bring together all of those who may be in need of cooperation while involved in the examination of various diverse and complex questions. On these occasions an employed engineer sits together with the appropriate deputy minister, the mechanical engineer with the biologist, the researcher with the administrator, the producer with the consumer, and they discuss the common problems as colleagues, irrespective of their offices or places of employment.

[Question] In your estimation, how fully are the proposals that reflect the technical intelligentsia's know-how and its willingness to help being utilized?

[Answer] It is a tradition reaching back several decades that the state organs present their plans and their concepts for technical development to various MTESZ platforms for evaluation. The party committees of the counties and the cities are well aware how important it is to base their decisions on the assessments of the members of the federation. On the county level the MTESZ is built organically into public life. In actuality it fulfills the role of a broadly-based, voluntary consulting agency. Regional developmental plans were all born with the help of these associations, and it was through their cooperation that a multitude of local projects for transportation, water management and settlement planning came into being.

Such cooperation has also developed among the ministries and various other central agencies and associations. At the moment we are in the process of establishing such close relationships also with the leading agencies of our capital city. We are establishing the Budapest executive committee of the MTESZ. We intend to enhance through this measure the solution of the complex construction, communications and other infrastructural problems that are inseparably connected with the development of the capital.

In answering your question, however, I still have to acknowledge that for the time being we are able to utilize only a fraction of the know-how of our technical intelligentsia even with the MTESZ. We definitely intend to change and to improve the situation. We are hoping that in preparing, bringing to conclusion, and in executing a particular resolution, the party and the state organs will request the opinions of the associations' experts in time, i.e., prior to having made the final decision. It is an encouraging sign that in the past few weeks the MTESZ's presidium has been approached on several questions of national significance by the various sections of our party's Central Committee, by the Council of Ministers, as well as by the other specialized ministries. In this way we were given a chance to make our views known concerning the Sixth Five-Year Plan, and in particular its scientific and technical aspects. We were asked to comment on the further development of the existing network of research institutions. The ministry of heavy industry has approached the MTESZ for its views concerning the economical use of domestic raw materials. Our technical experts always satisfy these demands. They reveal their views honestly and without any attempt to conceal anything. On this level their views are not being influenced by existential considerations.

It Has Lost Its Attraction

[Question] Most of the engineers, plant managers and young technicians whom I have encountered in the factories and in research institutes in the course of the past few years have complained about the alleged decline of the significance and importance of technical developments. Do you agree with this assessment?

[Answer] The 12th party congress has clearly emphasized the significance of technology and the sciences, and the role of the technical and agricultural intelligentsia, as well as the need to draw this intelligentsia into our public life. This attitude was greeted with great joy by our technical intelligentsia. Now it is expecting to see a new epoch, in the course of which technological developments will again occupy a worthy place in our public sentiment and in the eyes of our bureaucracy.

Many believe that in the course of the past decade the significance attached to technology and the sciences in Hungary has declined. There are those who believe that this phenomenon is the result of these fields having been pushed into the background by short-range financial considerations. Sadly enough, this is true even for today, notwithstanding the clear directives of the party congress. Our experts are of the opinion that we will not be able to conquer our economic problems, unless we utilize to a much greater degree our existing intellectual resources.

Let me note here that the technical intelligentsia has a great deal of respect for our financial and economic experts, and it recognizes the importance of their work. But it is a rather universal wish among them that, in this stage of our development, they should also strive first of all to establish even better conditions for the raising of the level of our technology than hitherto, and to do so on the basis of long-range plans. In my estimation, this is one of the key questions of our whole future.

[Question] Recently much has been said in various meetings about the general condition and disposition of the technical intelligentsia. What are your views on this question?

[Answer] Many people are raising very thoughtful questions from various directions. They appear to see contradictions between words and deeds. In the wake of the party congress many of us have raised the question that the development of an up-to-date product composition and competitiveness on the world markets presumes the speeding up of our technological developments, both on a short-range and a long-range basis. The technical fields have lost much of their former attraction in the eyes of the young. We can also detect feelings of uncertainty and dispiritedness among many of our engineers. They claim that they encounter too many superfluous bureaucratic obstacles. They do not really feel, so they claim, the moral and material support of society.

I am sorry to say that more recently we are often confronted with situations when gifted children of workers' families are increasingly reluctant to subject themselves to the hardships of five years of study at a technical university. When we search for the causes of this phenomenon then we find that in the course of the past ten years the pay scale of the technical experts, as compared to that of the workers, has worsened considerably. Nowadays the salary of employed engineers is hardly better than that of trained workers, and at times it is even less. And if we add to this the fact that engineers are at a disadvantage even in the allocation of apartments and places in kindergartens and nurseries, than we cannot be surprised at this lack of enthusiasm.

From Proposals to Realization

[Question] If the know-how and the ability of the technical intelligentsia remains unutilized, then this group will undoubtedly break a path for itself in areas that are much less essential for society as a whole. I believe that this harmful process has also been noted with the federation.

[Answer] Many have voiced the view that a portion of the well-trained experts are not giving their best at their places of employment. This is true even though society's best interest would demand that these employed and trained experts should give their best and should secure respect for themselves at their places of employment, and not elsewhere. I am sorry to say that in this respect not everything is well with us.

There is another thing that has to be mentioned in this connection. Many feel that they have to perform in low level jobs that are not commensurate with their education. Moreover, on top of all this, they don't even have the opportunity for self-improvement. In my estimation, this is the result of an unhealthy division of labor among the various categories of technical experts, such as technicians, the production engineers and the graduate engineers; primarily because there is a shortage of technicians. About a decade ago the training of technicians had been stopped on the basis of considerations that since were proven to be wrong. For years we were unwilling to recognize this phenomenon, and perhaps some of us are still unwilling to do so. This has created problems that may not be rectified for many years to come. The above remarks may constitute a detour, but they do relate closely to our topic.

[Question] Returning to the activities of the MTESZ, what are your plans, what changes do you envisage in order to make your work more successful in the future?

[Answer] It is self-evident that we will have to gear our work to national goals, i.e. to the directives of the party congress and to those of the new five-year plan. At the present, in light of the congressional resolution, our experts are working on the execution of five significant coordinated goals. We can already show some results. Let me just mention, for example, our work on energy management, or on the utilization of our intellectual resources.

We have always transmitted all of the worthy proposals made at the MTESZ forums, as well as all the studies elaborated in the committees to the appropriate governmental agencies and to other institutions that may have been interested in their use. Our greatest current problem is to prevent the many technical-scientific ideas that have been worked out by our experts from remaining simply ideas. It is for this reason that we have decided that in the future we will not be satisfied by the simple transmitting of ideas. We will follow their paths right up to the point of their realization, and we will cooperate in removing all obstacles from their paths. In this connection we will also follow carefully the activities and progress of our associations' younger members.

I am convinced and I hope that in the wake of the current association and county meetings, and especially after the election of new officers at the next year's MTESZ Congress, the active participation of young experts in the leadership and in the working committees will increase. The above, of course, constitutes only a small fraction of the ideas and problems that occupy the thinking of the current leadership of the MTESZ. What we regard as our most essential task is to bring to the surface the already existing, but as yet unutilized intellectual resources. There was never a greater need for this than under the current economic conditions--the first secretary concluded his remarks.

9271
CSO: 2502

BRIEFS

PEST CONTROL RESEARCH--The Plant Protection Research Institute has experimented with sterilization of pests as a control measure. Their effort was concentrated on the codling moth as a subject. According to Dr Laszlo Varjas, synthetic substances which affect insect hormones and resemble the juvenile hormone have been developed. These substances produce physiological disturbances in insects so that they become unviable. Although several thousand such hormone analogues have been synthesized, their widespread use is hampered because of the costs involved. In Hungary work of this nature has been done at the Technical University and the Central Chemical Research Institute. The United Pharmaceutical and Nutriment Factory is working on a similar hormone analogue. Another way of combating insect pests is by extracting substances which deactivate hormones from plants. The Plant Protection Research Institute is conducting preliminary tests with such "antihormones" on the boll weevil. [Budapest MAGYAR HIRLAP in Hungarian 12 Oct 80 p 11]

CSO: 2502

OPERATION, CHARACTERISTICS OF THE ES 1032

Budapest SZAMITASTECHNIKA in Hungarian Jul-Aug 80 p 13

[Text] The ES 1032 computer system has been imported from the MERA-ELWRO factory of Wroclaw since 1975. The central unit, the entire remote data processing subsystem, the tape storages and the slow periferials are being manufactured by the Polish computer industry.

Regarding the realization of operative memory, it is a ferrite storage made by planar technology, having a 1200 ns time cycle and a 500 ns access time. Regarding its organization, it is a 3D-type storage with Byte organization. During a storage cycle, it is accessible in a span of 4 Bytes. Every Byte contains an independent parity bit.

The modular construction guarantees a fast localization of malfunction as well as great flexibility. A single memory module has a capacity of 128 Bytes. A maximum of 8 modules may be turned on when the storage capacity is 1 MByte. The individual memory modules can be labelled separately, and consist of 8 16-KByte changeable cards.

Labelling of the informational Bytes is done with a 24-Byte label register which can accommodate labelling up to 16 MBytes although the maximum practical storage capacity is 1 MByte.

The processor implements the instructions in the order of storage. It works together with the operative storage, does arithmetical and logical operations, and initiates data transfer in the channels. It uses 16 (4 Bytes wide) general registers for the temporary storage of fixed, logical and indexed operations, and 4 (8 Bytes wide) floating registers for the temporary storage of floating operations.

The processor's logical architecture and breaker system is compatible with the principles employed in the IBM 360 series. With regard to its principles of operation and control, it is similar to the IBM 360/50 model. The characteristics of the control system are: logic with microprogrammed control; hardware control in the operative storage; microprogrammed and hardware control during the joint operation of the processor and the channels. We measured the processor's operational speed with a program independent from the system which is suitable for the examination of the central unit of both the ESR and the IBM 360/370 machines.

The program examined, which one of the 194 different standard and optional functions are built into the given central unit and what their operational speed is. From these data, it calculated the averages according to the Gibson norms as well as the so-called Commercial Mix. A few comparative data are shown in the table below.

	1	2	3	4
ES 1030	52,774	77,890	49,638	35,353
ES 1032	201,023	269,801	190,473	159,194
IBM 370/115	22,407	36,390	19,725	30,807
IBM 370/145	185,827	278,301	164,650	202,272
IBM 370/166	536,582	664,042	482,762	449,766

The numbered columns indicate the average operational speed (operations per second) according to the following norms:

1. Gibson I Scientific Mix,
2. Gibson III-S Scientific Mix,
3. Gibson III-D Scientific Mix,
4. GPO-WU-II Commercial Mix.

Note that the comparative data of the table above show only the internal characteristics of the processors and are less characteristic of the running speed of one or another concrete program, for this is greatly affected by the generating parameters of the given operational system and by the system's other characteristics such as, for example, the use of the background, input and output operation etc.

The input-output system makes the connection between the processor or memory and the other elements of the system. Communication between the periferial control and the channels is done through the I/O interface.

The channels are connected between the processor (and the operative storage) and the periferial control. The system has two types of channels: the multiplex (MPX) and the selector (SEL).

The SEL channel has a single subchannel while the MPX channel may have 128 or 256 subchannels. The MPX channel can operate both as a selector and a multiplexor. In the selector method, data transfer is done in groups while a periferial monopolizes the channel during the time of transfer. The SEL channel can operate only as a selector. Three selector channels have been built. A single channel's transfer speed is 1.1 MBytes per second while thetotal transfer speed is 2.5 MBytes per second. In the multiplex method, several subchannels operate simultaneously in the MPX channel. The data-Byte collected from one of the periferials is stored by the subchannel which in turn puts it in the appropriate place of the operative storage in the given time. The I/O interface serves the simultaneously operating periferials connected to the appropriate subchannels, in a time-dividing way. The periferials operating in the MPX channel can also operate in the selector method (the so-called CU forced burst method). Transfer speed: 145,000 Bytes per second in the multiplex method, and 470,000 Bytes per second in the burst method.

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POLAND

MERA 400 MICROCOMPUTERS SYSTEM DISCUSSED

Budapest SZAMITASTECHNIKA in Hungarian Jul-Aug 80 pp 12, 15

[Text] The MERA 400 universal minicomputer is an original Polish equipment with a bus-system and modular construction. The operative storage can be expanded from a capacity of 64 KBytes to 1 MBytes through a simple connection of the memory modules to the main bus. It has a priority breaker system, a real-time clock and an automatically reopening power circuit in case of power failure. It can operate in a two-processor system--with a joint memory.

Its operational systems are the SOM-3 in multiprogrammed operation, and the SOM-5 in interactive operation. The MERA 400 is suitable for scientific and engineering calculations and for regulating technological processes. For the latter case, the MERA 400 is also equipped by a real-time channel which connects the machine with the guided section.

The main peripherials connected to the MERA 400 are as follows: PD 9425 (SM 5401) magnetic disc unit, PT-305 (ES 5001) half-inch magnetic tape unit, PK-1 (ES 5091) 1/8-inch magnetic cassette unit, SP-45-DE (SM 5602) floppy disc, DZM-180 (ES 7186, SM 6302) matrix presser, DW-3 (ES 7033) line presser, MERA 7900 (SM 7209) display, and STP-3 (SM 6204) punch card station.

The MERA 400 is manufactured by the Scientific and Manufacturing Center for Calculating and Measuring Technology of Warsaw. It makes 100 to 200 systems annually.

The MERA 400 is a general-purpose, 16-Byte minicomputer. As a result of its modular construction, the system can be simply expanded. Its great reliability is guaranteed by medium integrated circuits: the functional units are easy to service and do not require air conditioning. Technical service is made effective by appropriate testing equipment and a wide array of testing and diagnostic programs. The multi-accessible and multi-programmable operational system, the high-level programming language (FORTRAN IV, BASIC) supported by an extensive program library, and a reliable hardware make it a widely applicable, comfortable and effective tool for the user. The system consists of modules which communicate with one another exclusively through a standard interface. This is constructed in such a way that the connection of further modules (e.g., rapid storage units and microprocessors) is possible.

The system's maximal hardware configuration consists at present of the following:

--2 processors, 17 operative storage modules, and 16 input/output channels.

At present, three kinds of channels are available:

—a programmed channel which makes it possible to connect a maximum of 8 periferials (these can operate in a start/stop or in a synchronized way by a slow transfer speed); a direct (storage-accessible) channel which makes it possible to connect 2 magnetic discs and 5 magnetic tape units; and the automatic equipment that regulates industrial objects.

The channels may be connected to the operative unit in any combination. One operative storage module has a capacity of 32 Kilo-word (the word length is 16 bytes). The storage modules' time of accessibility is 400 to 600 nanoseconds. The basic storage module is divided in a software way into a system block and a user's block which are accessible only through the software.

The specifications of the MERA 400 system's central unit are:

—16-byte word length; direct labelling: 32 Kilo-words, i.e., 64 Kbytes; 8-16-byte general registers, of which 7 are accumulating or index registers; maskable, 11-level breaker register, with an automatic feeding of the hardware organization of the breakings and the specifications of the breaking.

—real-time clock: automatic program-filling and network-protecting circuit and automatic re-start of the programs; a set of commands consisting of 132 commands; three kinds of command modification.

The processing unit may be installed by a multi-precision hardware operative element which makes it possible to implement special commands; with the help of these, the four basic operations and the normalization of numbers of double word-length or of fixed and floating long numbers can be carried out.

The real-time clock makes real-time operation possible by generating a program interruption in one of the following time intervals: 2 milliseconds, 10 milliseconds, 20 milliseconds, 40 milliseconds and 80 milliseconds.

The MERA 400 has a wide selection of periferials; these are as follows:

—CT-2100 punch card reader, DT-1053 tape puncher, DZM 180 matrix presser, KSR-DZM-180 matrix presser with a keyboard, MERA 7952 display, MERA 7905 group control, MERA 9425 magnetic disc unit (capacity: 5 MBytes), PT 305 magnetic tape unit, PK 1 magnetic cassette units (operates with two cassettes), SP 45 DE floppy disk units (with a capacity of 270 Kbytes for each disc; operates with four discs), DW 3 line presser (160-column line presser; pressing speed: 110 lines per second).

The MERA 7905 group control is especially noteworthy which makes possible the on-line operation of 8 special displays and 2 DZM 180 matrix pressers with keyboards through a single input/output of the programmed channel. The display units can be connected with the group control by a maximum 600-meter long coaximal cable.

The DZM 180 keyboard matrix pressers and the MERA 7905 group control can also be operated far away from the computer through the V 24 interface and by interposing MODEM's and telephone lines.

The MERA 400 system is delivered together with the SOM 3 multitask operational system.

The operational system helps in developing supervisory systems and in using the system's resources economically. It makes it possible to deal with complex software problems--especially with real-time problems--and to organize large computing centers. The system is equipped with an extensive program library which aids the development of user's systems and programs.

The library contains, among other things, the following: FORTRAN IV, together with the real-time extensions; interactive, multi-console BASIC; macroassembler; sequential and directly accessible file-operating processors; link editor, which connects the object-program modules and makes possible the development of the overlay structure; cataloger, which makes possible the development of the dictionary files of the object-program modules; sequential library update; source update, for processing files in the original language; and debugger (track-following program), for the aid of shooting programs.

Perspectives of Developing the MERA 400

The MERA 400 system will be equipped in the future with 30-Mbyte magnetic disc units, DIGIGRAF-type plotters, a graphic display and a channel that works together with the IEC interface. In the area of software, i.e., data processing, control, technical/scientific calculations, service for clinics, hospitals and analytic and diagnostic laboratories, and industrial process control, which requires a constantly increasing program package, the introduction of the following has been planned in addition and within the basic software framework:

--operational systems: SOM 5, for local and long-distance conversation; SOM 7, suitable for parallel processing on the basis of the LOGLAN "simultaneous" programming language (an original program language developed in Poland).

--translators: COBOL, SIMULA 67.

The MERA 400 is suitable for solving the following problems in problem-oriented configurations:

--complex technical/scientific calculations, with the possibility of simulation and optimalization of the solutions and under the conditions of operations in conversation and long-range accessibility of the large data bases; control of uninterrupted and discrete production processes at the level of the manufacturing sectors, through the use of CAMAC connectors or channels; service for clinics and hospital wards and larger analytic and diagnostic laboratories and management and administration data processing; real-time processing; remote-batch processing; and data collection and distribution.

The MERA 400 systems may be connected at will to large computers (e.g., to machines of the ESR series) as intelligent terminals on the lines of data transfer. The other way around, numerous periferials can be connected to the MERA 400 through telephone lines as long-distance data end stations (DZM 180 matrix pressers with keyboard, MERA 7952 displays and MERA 7905 group controls with displays and pressers).

If we also consider the added possibility of connecting, similarly to the above, i.e., through telephone lines, the Polish-made 8-byte MERA 100 and MERA 200 minicomputers as well—the function of which is data collection and processing—then it becomes evident that wide computer networks may be built in the various areas of the national economy.

The MERA 400 systems have been mass produced in the last years, and there are about 250 computers in operation at present. According to the plans for this and the coming years, annual production will reach at least 200 units.

The systems already working are employed in the following branches:

—in corporations and enterprises, for management, production planning, material and expense accounting, economic analyses etc.;

—in construction planning offices, for making construction plans automatically on the basis of construction type element catalogs, and for statical, qualitative and quantitative calculations;

—in industrial planning offices, for engineering calculations; for operating the data banks of the new development projects; in laboratories of research institutions and institutions of higher education, for collection and analysis of research data; in medical science, in the course of servicing the laboratories of hospitals and clinics, for collection and analysis of laboratory results in the intensive-care units and in sugar factories and large power plants, for regulation of industrial processes.

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END

JPRS 76878

25 November 1980

East Europe Report

SCIENTIFIC AFFAIRS

No. 688

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JPRS 76878

25 November 1980

EAST EUROPE REPORT

SCIENTIFIC AFFAIRS

No. 688

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S & T COOPERATION EFFORTS WITH SOCIALIST COUNTRIES STRESSED

Bucharest REVISTA ECONOMICA in Romanian No 40,3 Oct 80 pp 15-16, 27

[Article by Alexandru Dragut, chief of the Sector for International Cooperation and Relations in the National Council for Science and Technology: "Romania's Technical-Scientific Collaboration and Cooperation with the Socialist Countries"]

[Text] As a result of the efforts made by our party and state and Romanian scientists and researchers and through the orientation and development of scientific activities towards the most current problems related to the progress of the national economy and the uninterrupted technical progress in Romania, valuable achievements were made in a series of fields, such as: chemistry and petro-chemistry, oil drilling and processing, machine building, electrotechny, electronics, computers, mathematics, nuclear physics, medicine, agriculturem biology and others. In all the great achievements of our people during the years of socialist construction, the contribution of science, researchers and specialists in the different fields of activity is organically incorporated in these efforts, which, in further development and continuing the valuable traditions of Romanian science, contributed to the solution of the complex problems in moving our country forward along the path of progress and civilization.

In this regard, referring only to the period of the current five year plan, some synthetic data regarding the contribution of science and technology to economic development are especially significant: the production of over 10,000 new machines, equipment and installations, 5,000 new materials and consumer goods and nearly 9,00 new and modernized technologies; the attainment of over 30 percent of the current production of machinery, equipment and installations and over 90 percent of the technologies introduced in production based upon Romanian designs. All these achievements led to the fact that at the end of 1980, approximately 44 percent of the value of industrial production represented new and redesigned products that were introduced into production beginning in 1976.

The ever more vigorous affirmation of science in our society is the result of the policy of the Romanian Communist Party and the socialist state, which ensured the continuing development of the material base of research activities, the training of specialists and the growth of the role of modern science in all areas of economic-social affairs. Thus, from the 50,000 persons involved in research and development activities in 1965, the number rose to 200,000 in 1980, while investments for the material base of research grew 4.5 times over and current research expenditures grew nearly 10 times over during the same period. These growth rates are among the highest in the world.

A decisive role in the development of Romanian science and technology has been played by and is a permanent concern of comrade Nicolae Ceausescu, secretary general of the Romanian Communist Party and president of the Socialist Republic of Romania, for the powerful stimulation of Romanian creative scientific thought and its ever closer relationship to the complex demands of our society's progress, and for the firm placement of the greatest advances of the technical-scientific revolution at the basis of economic-social development and the entire effort to build socialism. Beginning with the specific needs for ensuring the general progress of society in the coming five year plan, as well as in the next two decades, and at the initiative and under the direct leadership of comrade Nicolae Ceausescu, the "Program-Directive for Scientific Research, Technological Development and the Introduction of Technical Progress During the 1981-1990 Period and the Principal Directions to the Year 2000" was drawn up, as well as the Program-Directive for research and development in the field of energy until 1980 and the principal guidelines until the year 2000, as adopted by the 12th Congress of the Romanian Communist Party. As the Secretary General of the party, comrade Nicolae Ceausescu, pointed out in his report to the 12th Party Congress: "The basic orientation of the program-directive is the affirmation of the technical-scientific revolution in all fields of activity, the growth of the role of science in the modernization of the national economy and all social life and in the management of society, the ever closer relationship between research and production, and the accentuation of the contribution of Romanian scientific creativity to the multilateral and dynamic progress of our country and to the enrichment of the store of universal knowledge, so that the coming decade will truly be the decade of science, technology, quality and efficiency."

All the workers in the field of scientific research, technological development and the introduction of technical progress are, thus, powerfully mobilized to make their contribution to implementing the tasks established by the party for the coming period. Under the leadership of comrade academician engineer Dr Elena Ceausescu, first deputy prime minister of the government and president of the National Council for Science and Technology, the central research institutes and appropriate academies in our country have adopted a new style of work and have more closely brought together the activities for current tasks and those for the future in economic-social construction, directing the research objectives for the 1981-1985 period principally towards the expansion of the base for raw materials and energy, the elaboration of new technologies for the more efficient use of national resources, the production of new types of machines, machinery, equipment and installations with lower levels of material consumption and high productivity and efficiency, the finding of ways to increase agricultural production, the better management of lands and waters, the growth of the quality of life and health care, and so forth.

Romania - Involved in the International Exchange of Scientific and Technological Information

The multilateral and sustained high rate of development of the national economy and science and technology in our country, corresponding to the demands of the scientific-technical revolution, made possible and necessary the continuing expansion of economic, scientific and technological relations with other countries and Romania's ever broader participation in the exchange of information on the world scale. Romania's active participation in the international division of labor and the exchange of scientific and technological information takes place on the basis of the principles of its foreign policy, founded on respect of national sovereignty and independence, fully equal rights, non-interference in domestic affairs and mutual advantage, and expresses itself in the permanent promotion of and support for efforts regarding the establishment of a new economic and political world order, the democratization of international relations, the elaboration of certain new norms of international law in accordance with the changes that have taken place in the world, and so forth.

In accordance with this policy, cooperation between Romania and other countries in the field of science and technology was expressed through the conclusion of a significant number of agreements, conventions and other bilateral and multilateral documents with over 75 countries, with all the socialist countries, with over 40 developing nations and with the majority of the developed capitalist countries in Europe, North America and Asia, documents which constitute the framework for achieving certain actions having important effects upon economic, scientific and technological development, and having mutually advantageous economic and commercial results for the partners.

In the expansion and strengthening of Romania's international cooperation and in the creation of an especially favorable framework for this, an especially important role has been played by the visits and discussions carried out by the Romanian chief of state, president of the Socialist Republic of Romania, comrade Nicolae Ceausescu, in a significant number of socialist countries, developing nations and developed capitalist countries, which, through the contacts made at the highest levels, premitted the identification of new possibilities for cooperation with these countries, including cooperation in the field of science and technology.

In Romania's overall relations for international technical-scientific cooperation, cooperation with the socialist countries is a leading concern which has continually developed and improved according to the multilateral economic-social developement of these countries. The scientific and technological collaboration and cooperation between Romania and the socialist countries is achieved in various forms, both bilaterally, especially through the intermediary of the Joint Commissions (subcommissions) for Technical-Scientific Cooperation, and multilaterally within the framework of CEMA and the other international organizations of the CEMA members, with numerous central organs and economic organizations and research-development organs in these countries being attracted to this activity.

Within the framework of collaboration with the socialist countries, scientific and technical collaboration and cooperation between Romania and the USSR occupies an important place and experiences a continuing development. Thus, on the basis of the Plan for Scientific and Technological Collaboration and Cooperation between the two countries, just in the current five year plan a broad cooperation is being carried out between the ministries, departments and organizations involved in research and design within the framework of an important number of objectives and themes of mutual interest in the field of scientific research and technological development. Currently, approximately 60 Romanian organizations and over 70 Soviet organizations are collaborating in research in fields such as: chemistry and petrochemistry, electronics, electrotechny, physics and nuclear physics, information and computer technology, energetics, non-ferrous metallurgy, drilling and drilling exploitation, machine building, construction and construction materials, crop improvement and grains and technical plant agrotechny, and so forth.

In preparing the basis for furthering collaboration during the coming five year plan, the "Program for Technical-Scientific Collaboration and Cooperation between Romania and the USSR for the 1981-1985 Period" was signed in Bucharest in June 1980. The Program contains an important number of objectives of scientific-technical cooperation, principally, the creation of certain new types of machinery and equipment, the development of certain new technological processes and new materials, and so forth, in fields such as: the mining and petroleum industries, chemistry and petrochemistry, energetics, machine building, electrotechny and electronics, automation and computer technology, metallurgy, construction, transportation, agriculture and the food industry and so forth. At the same time, it foresees the development of new themes for collaboration and cooperation in the top fields of science and technology of great importance and currency for the economies of the two countries, such as: the use of new sources of energy, the rational management and conservation of energy and fuels, the development of procedures for processing raw materials without residues, the use of industrial robots and computer technology in the management of technological processes, the expansion of the use of the technical physics, biology and genetics in the economy and so forth.

A favorable framework for the development of technical-scientific collaboration between Romania and the Soviet Union has been provided by the Joint Commission for Technical-Scientific Collaboration, created on the basis of the Inter-government Agreement signed in 1950. Collaboration through the intermediary of this agreement is directed towards cooperative actions in research and development on themes of mutual interest and, at the same time, towards the reciprocal forwarding of technical documentation and designs for machinery, installations, devices and industrial and social-cultural projects, as well as technical documentation for the production of new products and the raising of the level of quality of existing products, and towards the mutual exchange of biological materials, technical-scientific information and so forth. In addition to these exchanges, which involve important fields in the national economies of the two countries, such as the extraction industries, the chemical industry, electronics, electrotechny, the machine building industry, metallurgy and so forth, there are numerous visits by specialists for documentation purposes and exchanges of experiences.

Important results have also been obtained in the bilateral technical-scientific collaboration carried out through the joint commissions between Romania and the other socialist countries. There has been a significant reciprocal transfer of scientific and technological documentation, designs studies and so forth with Bulgaria, Czechoslovakia, the PRC, the GDR, Yugoslavia, Poland, Hungary, North Korea, Mongolia, Cuba and Albania, through the joint commissions for technical-scientific collaboration. Their application in the economies of these countries and Romania contributed to the more rapid use or improvement of certain machinery, equipment, installations and to the introduction of certain technological processes or the improvement of existing ones in the most important branches of the national economy. At the same time, the reciprocal exchange of specialists to learn advanced technical-scientific experiences and production experiences contributed to the continuing improvement of the training for personnel and to the introduction of new things in material production activities.

Fruitful technical-scientific collaboration has been achieved with the PRC in the fields of the chemical industry, machine building, electrotechny and electronics, computer technology, information and metallurgy, as well as in the better use of certain mineral raw materials. Valuable results have been obtained in collaborating with Bulgaria in the fields of metallurgy, machine building, chemistry and agriculture; with Czechoslovakia, the GDR and Yugoslavia in the fields of machine building, electrotechny and electronics, chemistry and metallurgy, construction and construction materials; with Poland in the fields of chemistry, ship construction, computer technology and the coal and metallurgical industries; with Hungary in the fields of machine buidling, electrotechny, chemistry and petrochemistry, the paper and cellulose industries and so forth.

Scientific and technical collaboration and cooperation between Romania and some socialist countries is also achieved on the basis of direct contacts between interested ministries and other central institutes, including, first of all, relations for direct collaboration established between the National Council for Science and Technology in Romania and the central organs for science and technology in Bulgaria, Czechoslovakia, Cuba, the GDR, Yugoslavia, Mongolia, Poland and Hungary. Important actions for scientific collaboration between Romania and the socialist countries have at their bases cultural-scientific agreements concluded at the governmental level, as well as conventions for collaboration and programs for applying these conventions concluded between the Academy of the Socialist Republic of Romania and the academies of sciences in these other countries.

In the cooperative relations between Romania and some socialist countries, an ever more important role is being played by the achievement through cooperation of certain projects in scientific research and technological development, on the basis of joint work programs and plans, in different fields in the national economy. On the basis of bilateral cooperation programs, during the 1976-1980 period joint activities were carried out to resolve over 300 objectives of scientific research and technological development of mutual interest. Within the framework of these objectives, many of the cooperative actions were treated in a complex fashion, from technical-scientific aspects to cooperation in production, with the close cooperation in the field of science and technology thus contributing in many cases to the development of economic cooperation.

The Socialist Republic of Romania's scientific and technical cooperation with some socialist countries is also achieved in a multilateral framework through our country's active participation in CEMA, on the basis of the Complex Program and special programs for long-term cooperation. Romania participates in approximately 100 agreements for technical-scientific cooperation in important fields of science and technology referring to: broadening the energy and fuel base and bringing into the economy new sources of energy; creating new technologies and improving existing ones for the better use of natural resources, producing new machinery, equipment and installations, as well as new materials and replacements for the national economy; and referring to programs for cooperation in fields such as: bio-physics, corrosion, plastics, catalysts, the better use of wood raw materials, planetary ocean resources and so forth. Certainly, it is not possible here to list all the directions and fields where bi- and multilateral cooperative actions are being realized between Romania and the socialist countries, actions that have had and have positive effects on both a scientific and economic level for all the parties involved, contributing to the progress of each participating country. What we want to stress is the fact that Romania has worked and is continuing to work for the development and furthering of relations for technical-scientific collaboration and cooperation with all the socialist countries.

The Growth of the Role of Science and Technology in Romania's Foreign Affairs

The Program of the Romanian Communist Party, the Directives of the 12th Congress and the Program-Directive for Scientific Research, Technological Development and the Introduction of Technical Progress in the 1981-1990 Period and the Principal Guidelines to the Year 2000, as well as the Program-Directive in the field of energy for the same period, foresee for the coming period a special growth in the contribution of science and technology to the entire economic-social development of the country, the satisfaction of the specific demands of modernizing industry, agriculture and the other economic branches, and the improvement of the organization and management of all of society. As a result, in future years, techincal-scientific cooperation will play an ever more important role in Romania's foreign affairs, with the development and intensification of cooperation in science and technology having to correspond to a greater degree to the needs of accelerated growth and modernization of the forces of production, to facilitate broad access to the achievements of contemporary science and technology and to contribute to a greater degree to the development of the national economy.

For the purpose of achieving these objectives, Romania's technical-scientific collaboration and cooperation with the socialist countries will continue to develop. To this end, bilateral programs for cooperation for periods of 5 and 10 years have been concluded or are in the process of being concluded for the purpose of resolving through joint efforts certain objectives in scientific research, technological development and the introduction of technical progress. Programs have already been signed for cooperation with Bulgaria, the GDR, the Soviet Union, with others to be signed this year with Czechoslovakia, Cuba, Yugoslavia, Mongolia, Poland and Hungary.

The objectives for cooperation that have been agreed upon or are in the process of being concluded are directed towards resolving certain research and development projects designed to lead to: the reduction of material production costs, keeping in mind the conservation of metals, coke, energy, and wood, the combatting of corrosion, the reduction of the specific consumption rates of raw materials and energy; the better use of certain new resources of raw materials (providing a base of raw materials for aluminum, better use of bituminous coal, deposits of rare metals and non-ferrous minerals), including the use of deep drilling, marine exploration and off-shore drilling; the production of new items in the electronics industry, the improvement of the life-time of electronic components, the production of computers and the drawing up of information system programs, especially for the management of production processes; the design and production of new machines, equipment and installations, as well as new automated digital-command machine tools; the improvement of the quality and diversification of production of synthetic threads and fibers, plastics, industrial catalysts, internal combustion motors and new construction materials; the optimization of processes and the increase of capacities in production in the field of transportation and telecommunications; the growth of grain production, the creation of new technologies and the improvement of existing ones for the protection of plants, the growth of animal production through the improvement of breeds and the growth of forestry production through the improvement of low efficiency tree farms; and, the development of research in the field of health care and the production of medical devices and medicines.

In the achievement of the agreed upon actions or those that will be agreed upon with the other socialist countries, we have in mind the use of certain varied forms of collaboration, such as, for example: carrying out on a contractual basis joint programs for research-development projects of mutual interest; joint use, on a contractual basis, of certain laboratories, pilot or experimental stations and so forth, that exist in Romania and in the partner countries, forwarding of mutually advantageous results of scientific and technological research for the purpose of later cooperation in production; reciprocal granting and receiving of technical, scientific and technological assistance in the achievement of certain research-development programs; reciprocal carrying out of certain services in the areas of research activities (analyses, studies, checks, measurements and so forth); use through cooperation of certain results of research conducted in Romania or in the other partner socialist countries, for the purpose of satisfying the needs of both parties in certain products; construction and joint use of certain laboratories, pilot or experimental stations, design bureaus and so forth.

The scientific and technological collaboration experience to date between Romania and the other socialist countries and the valuable results obtained, as well as the existing broad possibilities for expanding the mutually advantageous relations in this field, justify the conviction that Romania's ties for technical-scientific cooperation with these countries will experience a continuing development.

On a broader scale, in accordance with the political, economic and social trends in the evolution of the contemporary world, Romania is working and will continue to persistently work for the development of technical-scientific collaboration with all the countries of the world and for the establishment of a new economic order in international affairs that will permit the unrestricted development of international economic relations on equitable and fully democratic bases and ensure active participation in the world economic circuit under truly mutually advantageous conditions, as well as for the access of all countries to the achievements of modern science and technology and for the elimination of any type of restriction and discrimination in international economic relations.

The subordination of the objectives of science and technology to the economic and social needs of the country, needs that are constantly more complex and broader, the support of future trends of a fully flowering Romanian economy and culture through the activities of scientific research and technological development, and the greater and greater use of its own resources of creative ability will contribute, without question, to raising Romania to a new level of progress and civilization. Through this, ever better conditions will be created for the expansion of Romania's participation in international scientific-technical cooperation and for the increase in the contribution of Romanian science and technology to the enrichment of the world store of knowledge and the achievement of development programs of contemporary mankind.

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CSO: 2700

BRIEFS

CSSR DREDGE FOR LENINGRAD--In the next few days, one of the largest floating dredges in the world will be shipped from the Czech Shipyards in Prague to Szczecin, where it will be turned over to a Soviet customer. Part of the vessel's superstructure will be transported in other boats, so that the vessel can pass under the bridges encountered over the rivers and canals on the way to Szczecin. The dredge will then be fully assembled before being transported via sea to Leningrad. The dredge is the 338th technical vessel delivered by the CSSR to the USSR since the signing of the long-term cooperation agreement between the two countries in 1953. [Prague ZEMEDELSKE NOVINY in Czech 1 Nov 80 p 8]

CSSR SHIPYARD EQUIPMENT FOR GDR--The SKODA enterprise in Plzen has completed assembly of the largest yet drilling and milling equipment for the Schwerin shipyards in the GDR. The machinery capable of processing parts 10 meters long and 30 meters high will be used in production of deck equipment for oceangoing ships. [Prague ZEMEDELSKE NOVINY in Czech 1 Nov 80 p 8]

CSO: 2402

EDUCATION OF NUCLEAR ENGINEERS, PHYSICISTS IN CSSR

Prague POKROKY MATEMATIKY FYZIKY & ASTRONOMIE in Czech No 4, 1980 pp 181-185

[Article by Ivan Stoll, dean of the Faculty of Nuclear and Physical Engineering, Czech Institute of Technology: "Twenty Years of Educating Nuclear and Physical Engineers"]

[Text] We have been thinking more and more, recently, about issues in the education of physicists and mathematicians and their employment under the developmental conditions of a mature socialist society. We have been speaking at times about the application of physics and mathematics, at other times about applied physics and mathematics, and we have been considering questions of the division of labor between physics and mathematics on the one hand, and between engineers and personnel in other disciplines on the other. Numerous related fields are springing up, and they are beginning to achieve their first significant successes.

Economic factors play an important role in these considerations. Research in physics itself requires ever more sophisticated experimental technology and extensive engineer support, while in return, physical findings can significantly influence the efficiency, productivity, and quality of production processes. It is therefore clear that a socialist society has an interest in this subject, and a right to demand that resources invested in physics research bring a maximum return. This is not meant, however, to underestimate the basic, pioneering research, which incidentally often receives its stimulus from just such a resolution of socially pressing tasks. It is known that the training of natural scientists and engineers has taken place in our country at traditionally separate higher education institutions of the university and technical type. At the same time, the conceptions of mathematics and physics education at technical schools has not always corresponded to the potentials and levels which are desirable, given the current progress in these two scientific disciplines. It is possible to say that even in view of the current restructuring of college curricula, the question of mathematics and physics training at technical schools and its integration with professional disciplines has not yet been resolved. On the other hand, university education has not always acquainted its graduates to a sufficient extent with the requirements of technical work, and has oriented them rather towards basic natural scientific research or pedagogical functions.

This situation is to a large extent specific to our country. Abroad, the differences between the education of natural scientists and technicians are not, as a rule, so sharply separated. Engineering departments at universities, and natural science departments at technical schools are not rarities. A number of schools exist, many of them prominent, which integrate natural scientific and engineering education--allow me to cite the Ecole Polytechnique in Paris, the Massachusetts Institute of Technology, the Moscow Engineering and Physics Institute and the Moscow Physical Technology Institute, and others.

At both of the above Moscow institutes a form of pedagogy is used consistently which requires independent scientific work from the students and participation in the solution of practical tasks. The Moscow Physical Technology Institute has an agreement with the USSR Academy of Sciences, according to which students in the higher classes are incorporated as whole groups into the research institutes of the academy, where they work in research teams and the academy personnel consider it a highly responsible duty to guide these students pedagogically and lecture to them.

An experiment has been attempted at the Moscow Engineering and Physics Institute in which students with talent in mathematics and physics were systematically sought out at various colleges in the USSR, and then concentrated there for intensive education. It is well known that the pedagogical techniques and textbooks developed at these institutes determine to a large extent the direction of education at the remaining schools and departments as well, and that the graduates of both institutes find positions at the locations of the most intensive research in applied physics, nuclear, space, and other pioneering technologies. In addition to these and other institutes, faculties of physics and mechanics exist at Soviet polytechnical schools which educate engineers for the mathematics and physics base. Physics and Mechanics Faculty of the Leningrad Polytechnic Institute has, for instance, a curriculum very near to our needs, and which was conceived as early as 1919 under the guidance of Academician A. F. Joffe. In addition, specialized technical institutes as a rule offer mathematical and physics specializations directed at specific engineering branches in addition to the classical engineering courses.

There are a number of reasons for this interpenetration of mathematical and physical scientific disciplines and technology. One of these is the fact that modern technology is making more and more use of mathematical and physical findings, which are becoming the inspiration for further technical progress. A second, no less important reason, stems from the reality that changes connected with the modernization of production and techniques lead to the necessity of constantly updating the content of an engineering education. This permanent requalification procedure for engineers requires a sufficiently broad base in a mathematics and physics education. We need only recall the vigorous development of physical electronics and radiotechnology in recent decades and the physical findings in the fields of quantum mechanics, the physics of solids, quantum theories of radiation, and others, which have gradually become the basis of new technology. And, finally, the method of working in teams from basic research through applied and developmental research up to production requires the maximum facilitation of communication between disciplines, as well as demanding a conglomeration of experts with various backgrounds, including experts with a physics and engineering education. The potential for the peaceful use of atomic energy and the broad practical application of the findings of the nuclear sciences has been a powerful stimulus for thought and organizational measures in the areas of research and education. Following the initial successes of Soviet science and technology which demonstrated the technical and economic feasibility of nuclear energy installations in peaceful life, we signed, 25 years ago, cooperative agreements with the Soviet Union in this area. A number of scientific research, technical, and educational institutions came about which had the task of developing our nuclear science and technology in cooperation with Soviet scientists, to prepare for the beginning of one of the crucial stages of the scientific technical revolution. This all took place in an atmosphere of commitment, enthusiasm and historical optimism, and the desire for an education in these new fields was manifested in mass interest in their study, at both the undergraduate and graduate levels.

The Nuclear and Physical Engineering Faculty was created in 1955 under the name of the Technical and Nuclear Physics Faculty at Charles University. Here for the first time natural scientists--mathematicians, theoreticians and nuclear physicists--who had worked until this time at the Mathematics and Physics Faculty of the Prague University, met under one roof with engineers, but also with chemists and experts of other professions, in order to thus create a comprehensively conceived location for a new type of higher education corresponding to the conditions of a new stage of scientific and technical development. The basic conception of pedagogy and scientific research which the faculty received at its inception was created by our leading experts--Professor Vaclav Petrzilka and Academician Frantisek Behounek, both of whom are now deceased, and furthermore the current director of the Physics Institute of the Czechoslovak Academy of Sciences and deputy chairman of the Czechoslovak Academy of Sciences, Academician Bohumil Kvasil.

The evolution of the faculty over the past quarter century has not been direct and simple, but it has contributed many valuable experiences. In 1959 the faculty was incorporated into the Czech Institute of Technology in Prague, and it graduated its first two students a year later. In both its education of students and its extensive scientific and research activities the faculty has reacted sensitively to the rapid development of science and technology. Successes in plasma physics and the physics of solids, the appearance and vigorous expansion of quantum electronics and microelectronics, the technological utilization of charged particle accelerators, the application of the techniques of nuclear physics and nuclear chemistry to trade analysis, the radiational influencing of the properties of materials, new physical principles of automation technology, and findings concerning the structure of materials and their behavior under extreme conditions--all of these have been reflected in the educational plans of the faculty.

The relatively small number of students made it possible as well to develop nontraditional educational methods, above all the extensive utilization of individual plans of study and the differentiated instruction of gifted students, and their direct integration into the scientific research work in the departments and the institutes of the Czechoslovak Academy of Sciences, as well as sectors and other workplaces with which the faculty maintains close contacts. This principle has also become, according to the model of several faculties in the Soviet Union, the basis of the new system of studies within the framework of the nationwide restructuring. The new name of the faculty--Nuclear and Physical Engineering--was meant to express, above all, the comprehensive integration of all fields related to nuclear energy and technology (nuclear physics, nuclear chemistry, and nuclear engineering), as well as the formation of physical engineering as a special technical field. From the differentiated education of mathematically gifted students an additional specialty gradually developed, i. e. mathematical engineering, the graduates of which, having mathematics as the basis of their education, utilize mathematical techniques to solve concrete engineering problems, for instance in the theory of the administration and reliability of complicated systems and structures.

The faculty has, in the pedagogical and scientific area, a number of objectives and problems in common with its sister Mathematics and Physics Faculty of Charles University. In the new higher education complex in Prague-Troji numerous modern instruments and apparatus for physics are being installed today, such as a Van de Graaff accelerator, a neodymium and iodine laser with hundreds of joules of energy, systems for the modelling of kinetic processes in a nuclear reactor, and additional equipment which will serve experts from both faculties, as well as personnel from practical occupations.

On the other hand the faculty, as a component of the Czech Institute of Technology, is strengthening its ties with the other faculties of this our oldest and largest technical school, in an attempt to see that physics and mathematics penetrate increasingly into technology, and that new findings in physics are utilized in practice as soon as possible. The faculty shares in the differentiated education of both undergraduate and graduate students; the scientific board of the faculty, with the participation of all the mathematicians and physicists of the Czech Institute of Technology faculties, conducts the degree-granting administration and confers honors in the mathematical and physical disciplines. The further development of nuclear energy and modern technology will demand the ever closer cooperation of physicists and technicians and the participation of mathematicians and physicists in engineering education.

The focus of the scientific effort of the faculty is oriented towards those physical, mathematical, and nuclear chemical problems which are close to technical practice. In the nuclear area, for instance, these are the use of the neutron defraction method for the study of the structure of several minerals and industrial materials, the study of neutron kinetics in subcritical mass, and the flux density of resonating neutrons in the impulse reactor of the United Institute for Nuclear Research in Dubna. In cooperation with this institute a microtron irradiation facility has been built which will make possible the utilization of a highly effective source of neutron and gamma irradiation for practical needs. Faculty personnel are successfully sharing in the SPIN international research project directed at the study of the properties of directed atomic nuclei.

A sensor has been constructed at the faculty for the requirements of special personal and emergency dosimetry at nuclear power plants, and possibilities for the dosimetric utilization of chemiluminescent phenomena have been studied. New, prospective methods for the splitting of isotopes are being studied, and work is progressing on the determination of trace element content, especially mercury and radium, from the viewpoint of environmental protection. New results have been achieved in the radiational influencing of the properties of chemical catalysts and the electrical properties of silicon.

Research in physical engineering is directed at the improvement and utilization of advanced laser technology, at the technical applications of accelerated ionic beams, at the study of the luminescent properties of several single crystals and at the x-ray study of the structure of materials, of physical processes taking place under mechanical stress and brittle fracture. Several additional problems are also being studied.

Laser systems of various kinds (based on ruby, neodymium glass, yttrium-aluminized granat with enodymium admixture, carbon dioxide) are being used for both the study of laser discharge and of high temperature laser plasma, and within the framework of the Intercosmos program, for the precise determination of the position of artificial satellites and the global triangulation of the earth's surface. The research is being conducted in cooperation with the Lebedev Physics Institute of the USSR Academy of Sciences in Moscow, and in the next five-year plan an advanced iodine laser, which was developed in this institute and transferred to Czechoslovakia, is to be put into operation. Ion acceleration equipment built at the faculty is unique in Czechoslovakia and aids in the implantation of ions on semiconductors according to a precisely specified density, in the influencing of the mechanical properties of the surfaces of several types of steel and alloys, and in the semiquantitative analysis of the surfaces of solids. The possibilities of this progressive technological and analytical methodology will be able to be expanded further following the start up of the new Van de Graaff accelerator at the new complex at Prague-Troji.

Research into the mechanical properties of metals using x-ray techniques--in addition to other methods utilizing the scanning electron microscope--has contributed valuable findings concerning the physical processes connected with the distribution of current and energy in stressed components, the spread of voltage surges and cracks and, in its practical applications, has contributed to many millions of korunas of savings in many sectors of the national economy.

These are several selected tasks and directions which are occupying the scientific and research activity of the faculty. The physical issues encompassed by these objectives have been the subject of several articles which are published in this issue of this journal. I therefore wanted, on the occasion of the 25th anniversary of the Nuclear and Physical Engineering Faculty of the Czech Institute of Technology, to develop some thoughts about experiences from the education of young people who should be physicists and engineers simultaneously, the initiators of the new ideas and new paths which physics and mathematics are opening up for modern technology; they are to become the bearers of a more profound level of understanding among natural scientists and engineers.

9276
CSO: 2402

BRIEFS

CSSR-CUBA COOPERATION INTENSIFIED--Recent negotiations between the Chairman of CSSR's State Planning Commission Vaclav Hula and the Minister-Chairman of the Cuban Central Planning Council H. Perez have intensified cooperation between the two countries. Under a long-term CEMA program, Czechoslovakia will participate in production and processing of citrus fruit in Cuba. It will also increase its participation in development of Cuban energetics, science and technology. Czechoslovak geologists actively participate in mineral exporation in Cuba and both countries exchange their scientific and technological know-how. A laser satellite radar developed by the Nuclear and Physical Engineering Faculty of the Czech Institute of Technology in Prague has been operational in Santiago de Cuba, as a part of the INTERKOSMOS program. Besides the USSR, Czechoslovakia is the most important supplier of energetic equipment to Cuba. Shortly after 1959, Cuba and Czechoslovakia signed an agreement for construction of the thermal power station in Cienfuegos. In 1972, the sixth block of the "Otto Parellada" power station in Havana became operational, followed by a similar unit at the Havana power station "Regla" in 1976. A number of additional construction projects followed, one of the largest being the power station in Nuevitas. [Prague PRACE in Czech 30 Oct 80 p 2]

CSO: 2402

BRIEFS

MICROCOMPUTERS, MICROPROCESSORS SYMPOSIUM--The II Symposium on Use of Microcomputer and Microprocessors will be held in Budapest at the House of Technology [Technikai Haza] from 6-9 October 1981. Stressed subjects of the international symposium are: process control, peripheral systems, data processing, training, system development and developing systems. The Symposium will be under the sponsorship of the Hungarian Academy of Sciences and the National Technical Development Committee. Official languages of the Symposium will be English and Russian. Important dates: Application cards and abstracts of the papers to be presented must be received by 10 January 1981; text of the papers should arrive in February 1981; a second summons and registration will take place on 15 March 1981; lecturers will be notified about acceptance of their papers by 15 April 1981 at which time the final version of said papers should be submitted. Applications will be returned and notification of where accommodations have been reserved will be issued in October. For application forms or additional information, write: Hiradastechnikai Tudomanyos Egyesulet, P.O.B. 451, 1372, Budapest; Phone: 113-027. All arrangements will be made by the Scientific Society for Communications Technology, Scientific Society for Metering and Automation and Janus Neumann Society for Computer Science. Application forms should include the following information: title of lecture, name, position, place of employment, address. This information should be sent to the previously given address by 15 October 1980. [Budapest SZAMITASTECHNIKA in Hungarian Sep 80 p 16]

CSO: 2502

MILITARY DEVELOPMENT OF FIBER OPTICS DESCRIBED

Warsaw GLOS PRACY in Polish 24 Sep 80 p 6

[Article by Bogdan Marks: "Fiber Optics, the Future of Electronics"]

[Text] For several years now the Jaroslaw Dabrowski Military Technical Academy [WAT] in Warsaw has been conducting research on fiber-optic conductors. The Department of Chemistry and Applied Physics, directed by Doc Dr Mieczyslaw Szutokowski, is spearheading research in this area. This group, which is headed by Lt Col (graduate engineer) Stanislaw Masterniak, has accomplished much in the area of fiber optics.

They manufactured and applied the first television fiber-optic link in Poland. It was produced from Polish-made electronic components. This link consists of a television camera, transmitter, fiber-optic cable and a television receiver and display unit which displays the transmitted image. The outputs signals from the camera are fed into a modulator whose output, in turn, is used to control an electroluminescent diode which transforms the electrical signals into optical signals. A DEL type Burrus diode is used in the design. Another component of the television link is the fiber-optic cable which consists of four fiber-optic conductors in a polyethylene shield that is reinforced with steel strands. A photodiode is used in the receiver as a photodector. Here the arriving optical signal is converted into an electrical signal which, when properly amplified, provides an image on the television monitor.

The ability of fiber-optic conductors to transmit very wideband frequency signals is a fundamental advantage. The link is very immune to interference. In addition, the electrical signals do not generate interference in the fiber-optic conductor, and it is impossible to intercept the transmitted information. Also, the light weight of fiber-optic cables enable great reductions in equipment weight and size. This is especially important when this type of technology is applied in aircraft and rocket onboard communications systems.

Quartz glass, which is made from raw materials that are abundant in Poland, is the basic material from which fiber-optic conductors are made. Normally they are built from cores made of quartz glass having various light refracting indexes and a plastic protective jacket. In the future, signal and information quality will depend on improvements in fiber-optic conductors.

Many firms in the world are now producing a wide assortment of fiber-optic conductors and cables, and junctions for transmitting and receiving modules which enable entire fiber-optic systems to be constructed. They are being applied in many areas of life, for example, in telecommunications, radar and medicine. In addition it is possible that they may be used by the military forces in the construction of field communication lines and on aircraft and ship onboard communication systems. Lt Col Stanislaw Masterniak's group is cooperating with many schools and institutions that are working for the needs of the national economy. The Institute for Electronics Technology in Warsaw is one of its permanent partners. Another WAT partner is the Department of Physical Chemistry of the Marie Curie-Sklodowska University in Lublin, headed by Prof Dr Hab A. Waksmundzik.

In the future, the WAT Department of Chemistry and Applied Physics aims to improve its work in the area of investigating properties of fiber-optic conductors; it also will manufacture electronic circuits for transmitting and receiving sets for television optic-fiber links.

11899
CSO: 2602

COMPUTER SYSTEMS PRESENTED AT INTERNATIONAL FAIR

Industrial Applications

Bucharest REVISTA ECONOMICA in Romanian No 42, 17 Oct 80 pp 11, 16

[Article by I. G.]

[Text] Fully committed to implementing in material creation the demands of the modern scientific-technical revolution, Romania's machine construction industry today can take pride in power sectors of electronics, information system, automation, which offer indispensible tools for mastering the extremely complicated production processes of the modern economy and directing them in the best system. The stormy advance seen in this five-year plan by these sectors and the rapid rate of innovation and diversification of production have permitted the Romanian producers of automation installions and computer technology, joined in the Industrial Central of Electronics and Computer Technology and the Industrial Central for Telecommunications and Automation, to be noted today as suppliers of complex equipment on the international market.

Whereas a defining characteristic of the modern scientific-technical revolution is the symbiosis between research-development work and production, we can say that this style of work is also fully seen in the Romanian industry of electronics and control engineering.

The vital nerve for utilization of the products of this industry in complex systems--the Institute for Research and Technological Engineering for Automation, Computer Technology and Telecommunications, IPATCI--is presently at current edition of the Bucharest International Fair with a new concept of offerings and export, the product of fruitful cooperation between research, education and production.

Whereas the emphasis in presentation at the preceding editions of the fair was placed on apparatus and electronic (hard) equipment, a broad space at the current Bucharest International Fair is being reserved for presenting in operation the control systems for the most diverse processes in the area of the economy, starting with metallurgy, chemical industry, machine construction industry up to the mining, petroleum extraction industries, scientific research, hydrometeorological monitoring.

Naturally, the current stage of development of the automation svstems, information processing systems which are original Romanian svstems permits the emphasis to move gradually from the offering of equipment (hard) to a complex offering of systems (hardware) and applicational (software) programs, with the quality of the latter proving itself more and more decisive for achieving high economic efficiencv in the processes controlled.

The complex automation installations, including with specialized or universal process computers being presented todav by Romanian industrv are bringing out the accumulation of rich technical experience doubled by a continuing creative effervescence which have led to marked successes on the international market, too. Opening the technical reference list of the IPATCI, we see that in recent years the institute participated with complex automation installations, with or without computer, in complex deliveries to export of installations or projects in branches such as energy, chemical and petrochemical industry, wood and construction materials industrv, agriculture and the food industry.

The export of engineering, consulting, know-how, applicational (software) programs, technical assistance and other engineering services thus find a greater and greater share in the deliveries of this sector, thus appropriately utilizing one of the country's most precious riches--technical intelligence. The confrontation during some international auctions for the delivery of control information systems with processing computers or for hydrometeorological control systems has brought out the high technical level and superiority of Romanian original concept and the competitiveness of the offerings of the Automation Design Institute, Computer Technology and Telecommunications compared with some very prestigious international firms.

Thus, the design for "An information control svstem for the Oltcit Automobile Plant" was adjudged during an international auction by the Automation Design Institute in collaboration with Cerci, a French firm. The svstem, in the advanced phase of working out the software and completely as hardware, is completely supplied with Romanian computer equipment of the Ecarom 800 type (control equipment for the industrial production process) and the Independent I-100 minicomputer built by the Enterprise for Automation Elements and the Enterprise for Electronic Computers, respectively.

The configuration of the system also includes Alpha numerical displavs built by the Enterprise for Periferal Equipment and a display delivered by the French partner. The beneficiary of the system, the Oltcit Joint Production Company, evaluating the system's performances, showed its interest in continuing to cooperate with the Automation Design Institute for deliveries to third markets. Actually, this control system in real time of a discontinuous process, characteristic of the machine construction industry, also can find uses in other subbranches. Another success registered during the international auctions of the Automation Design Institute-Computer Technology and Telecommunications and its collaborators refers to adjudging of the order during a International Bank for Reconstruction and Development design for working out and implementing an automated data gathering system and automatic hydrometeorological supervisory system. Operating at the national level with regional subcenters for taking over, processing and transmitting data in two stages, the system provides permanent control of the meteorological parameters and water level all over the country, at the same time being connected with the international supervisory system of the World Meteorological Organization. Much Romanian equipment is included in its structure. Thus, the automated hydrometeorological station picks up directly from the environment from an area with a radius of 500 meters through 9 translators of the hydro and meteo parameters. It should be noted that this equipment, although it is supplied with great sensitivity to environmental factors, can function installed under the most vicious conditions such as altitude, temperature, humidity and so forth. The designer is the Automation Design Institute, while the executor is the Enterprise for Automation Equipment, Bucharest, and the Institute for Power Research and Modernization, for the translators.

The link between automated stations and regional processing centers equipped with Independent 100 computer equipment is being achieved with the help of Telerom equipment for data transmittal by radio. The main job of these intermediary centers is to forecast the appearance of hydro or meteo events which are dangerous in the zone being supervised.

In the end, the center for picking up and processing the data which control the entire network, also supplied with Romanian electronic computers, through the Telerom high-speed modes takes over the data of the regional centers for centralized processing. The information obtained is utilized for weather forecasting at the national level in correlation with the information received (and transmitted) through the international network of the World Meteorological Organization. The software for the system was worked out by the Research Institute for Computer Technology in collaboration with the Central Information System Institute and the Institute for Meteorology and Hydrology.

Among the new systems presented during the fair we also mention the SDC 2050, "the distributed system for control of technological processes." The entire structure of the classical automation system, based on many regulators followed in "a room with the dispatcher's panels," is changed through the very concept of distribution on hierarchical decisional nodes for following a complex technological process through units for regulating the base, supplied with microprocessors, or , according to the case, programmable automatic machines or intelligent processing couplers.

The jobs carried out by the system--periodic control of operation of the installations, taking, selecting and centralizing this information, warning of changes occurring in the operation of the process in real time with a view to immediate intervention, remote control of the devices for action of the installations--recommend it for many automated industrial areas, such as the chemical, metallurgical combines and so forth. Management of process through the SDC 2050, with great flexibility and promptness, permits a rise in the degree of utilization of production capacities by avoiding damage to the equipment, reduction in the consumption of raw materials and energy and efficient utilization of maintenance personnel. In the configuration of the system we find Ecarom 800, Independent I-100, Romanian equipment. In building the system along with the Automation Design Institute-Computer Technology and Telecommunications a contribution was made by the Faculty of Automatics of the Bucharest Polytechnical Institute and the Bucharest Automatics Enterprise.

Romanian systems for numerical control, through the computer for the CNC-type machine tool in the Numeron family also are achieving special performnances at the level of the equipment built by General Electric or Siemens. Intended for complex machine tools, the new system distributed by numerical control, supplied with the Romanian Coral 4001 minicomputer produced by the Electronic Computer Enterprise in Bucharest, permits storing up to 10 processing programs, which may be recalled by the operator. For the overall system of man-machine, through utilization of the new control system a homogenization is produced between the machine's processing ability and the operator's directing ability, with the latter's performance being at the level of those of machine tools.

Also being presented for the first time at the Bucharest International Fair '80 are systems for dispatching of fields of oil and gas wells (Telerom SP and Telerom SG) in the production of the Factory for Automation Elements in Bucharest and IEIA, Cluj-Napoca, systems for processing and transmission of data with intelligent terminal (Telerom-P), products from the new industrial electronics enterprise in Cluj-Napoca which can find many uses in tourist agencies for asking the banks for data, introduction of data and long-distance processing of data, long-distance control of extraction in mines, postal services and so forth.

The family of Thetarom automated testing equipment is represented by the "testorul" [word unknown] for hydraulic turbines, for electric counters, for "plachete" [word unknown] with hybrid integrated circuits and analyzers—particularly requested equipment today in the international market for the quality control of complex products.

Presentation of the Thetarom equipment in the specialty halls--Brighton '79 and Paris '80—enjoyed praise from the foreign specialists and potential forign clients.

Being presented for absolutely the first time by the Automation Design Institute-Computer Technology and Telecommunications is CEN-80, a naval microcalculator intended to equip commercial ships for doing navigation calculations and loading calculations.

One may state that the Ecarom, Thetarom, Numerom and Telerom systems already are prestigious brands of processing automatics, symbols of Romanian technical intelligence. Electronum, the enterprise specializing in foreign trade, has available complete offerings from the producers with a view to carrying out commercial treaties for all the systems presented in operation at the Bucharest International Fair '80 edition.

Microcalculator for Naval Use

Bucharest REVISTA ECONOMICA in Romanian No 42, 17 Oct 80 p 8

[Text] In order to solve most operational problems of navigation and calculation on board any kind of ship, the Institute for Scientific Research and Technological Engineering for Automation, Computer Technology and Telecommunications has finished a modern electronic microcalculator of the 3.5 generation, which our industry already has introduced into mass production. The calculator, which is marked by operation in storm conditions, small energy consumption and reduced gauge, is being built in its entirety with broadly integrated circuits with semiconducting memory, microprocessor and so forth.

The CEN-80 electronic calculator is formed from an assembly of equipment, from a system for supply and another for program. Thus in "off-line" it can solve navigational problems, those referring to optimization of the ships' load, operation of technological installations on board the ships and various other calculations. Operating in closed cabins or command posts on board the ships, installed on consoles or on working tables, it offers great stability to mechanical shocks and vibrations with a frequency of between 5 and 80 Hz as well as the action of saline fog. It also can have surrounding temperature of between 0-40° C, relative humidity of 95 percent plus or minus 2 percent. The controlpanel has a complex construction and, among other things, includes an operational "tastatura" [word unknown] which permits the operator to place any program desired into operation. The data presentation subassembly provides both visualization of the parameters introduced as well as the results obtained following execution of the programs.

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CSO: 2702

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JPRS 76959

9 December 1980

East Europe Report

SCIENTIFIC AFFAIRS

No. 689

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JPRS 76959

9 December 1980

EAST EUROPE REPORT

SCIENTIFIC AFFAIRS

No. 689

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HIGHER PRODUCTION OF BS-350 SCANNING ELECTRON MICROSCOPE URGED

Prague ZEMEDELSKE NOVINY in Czech 25 Oct 80 p 3

[Article by Jan Subert: "A Television Transmission From the Realm of the Molecules"]

[Text] The shock which occurred in the world of science in 1677 has not ended--and it is no wonder. The audacity with which the Dutchman Antonius van Leeuwenhoek announced that he had constructed an instrument which overturned the declaration of the Royal Society of Sciences in London that the smallest living animal was the flea, was very revealing. But when Leeuwenhoek, the first man in the world to see protozoa and bacteria, convinced renowned scientists and "anointed heads" with his unprecedented miracle, his "telescope in reverse" had won conclusively, for centuries. The journey in search of the secrets of the invisible world which the Dutch optical microscope launched, and which today culminates in the Czechoslovak scanning instrument, had begun.

But let us remain in history, where the paths of science in search of knowledge sometimes forked or encountered deadends. The first important obstacle to successful penetration into the depths of the microscopic world was put down by modern physics. This happened at the turn of the 19th and 20th centuries, and the new finding was a shock for the microscope from which it was never able to recover. The judgment, against which even the very best glass lens was powerless, was: "The object of observation may not be smaller than one-half the length of a light wave. Light takes no account whatever of particles smaller than 0.0003 millimeters!"

What then? Radiation with a wavelength shorter than that of visible light could be a temporary solution, but scientists prudently reached for the smallest thing available, the electron. And when in 1931 the first electron microscope was built, the journey to the interior of matter--and this time into the realm of molecules--could continue. In all cases, indeed, it was necessary to observe an important condition: the specimen to be studied under the electron microscope must be processed into the form of an extremely thin slab or thick flake of thousandths of a millimeter, otherwise the electrons could not pass through it.

The transmission-type electron microscopes achieved fantastic magnifications, on the order of hundreds of thousands or a million. But they also brought with them problems regarding the sharpness of the image and the inconvenience of looking only at flat samples. Accordingly the scientists' ideal became an instrument which could eliminate these difficulties by means of reflective illumination, and would also make possible direct observation of the surfaces of solid preparations opaque to electrons, which could be prepared with the same ease as specimens for the optical microscope. But was it possible to build such an apparatus?

An affirmative answer is given by the so-called "scanning electron microscope," one of the true miracles of modern science and technology. It does not work on the basis of some new and revolutionary phenomenon, but the cleverness with which it uses the well-known "line principle" of producing a television image is nonetheless admirable.

This time the narrow electron beam neither passes through the specimen nor is directed at one location, but travels across the surface of the object to be studied from one side to the other. Its speed and position are closely matched by another electron beam which is emitted at the same time against the screen. The interaction of the electrons with the surface of the specimen causes these particles to be reflected, but so-called "secondary electrons," photons and other particles, are also produced, and after amplification they affect the brightness of the beam at the viewing screen, where a suitable magnified image of the item being studied is produced.

The technical mastery of this process, which makes it possible to use specimens measured in centimeters and to study parts of them magnified as much as a million times via extremely sharp pictures directly on the screen, is certainly immensely difficult. For example, after the specimen is placed in the microscope, it is frozen and examined in a complete vacuum. For comparison, while the pressure of the air which surrounds us at home, on the street or in nature is able to raise a mercury column about 75 centimeters, in this artificially created vacuum it would reach a height of 0.00001 millimeters. Thus three of the most modern disciplines, ultrahigh vacuum technology, cryogenics and microelectronics, come together in a single instrument.

Thus far only six countries have ventured to produce scanning electron microscopes: The Soviet Union, the United States, Japan, the UK, the Netherlands and Czechoslovakia. And it is even more gratifying that our Czechoslovak instrument is at the absolute summit worldwide in certain of its characteristics. Its capabilities include, for example, that of effecting a direct television transmission from the microscope world and recording it on a video tape recorder. Moreover, it is possible to observe the specimen stereoscopically or to connect a unit for X-ray microscopy and a computer, thus creating an analytic instrument which instantly spews out the precise elementary composition of the specimen in percentages.

The Czechoslovak scanning electron microscope, which is designated the BS-350, was built by the Brno Institute of Instrument Engineering, CSAV, by a team of experts led by the institute head, Corresponding Member of CSAV Armin Delong. The first prototype was produced in 1976, and to date a mere 6 of the devices have seen the light of day in Tesla in Brno, which is in charge of production. In spite of immense interest at home, in CEMA countries and in capitalist countries, where 180,000 dollars has been offered for it, it has thus far been impossible to gear up for more extensive production. Why?

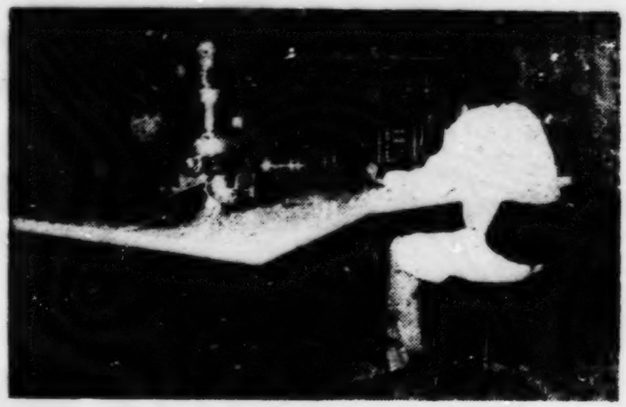
The main problem, according to leading workers in Tesla Brno, is the low labor productivity in one-off production, which is not cost-effective for the enterprise.

But neither would "series" production yield more than a few dozen units a year. It makes no sense to criticize the manufacturer, Corresponding Member A. Delong reminds us. According to him, Tesla is doing everything possible to accommodate the developers of the microscope, but it cannot free itself of the criteria which restrain it.

The same view is held by CSAV Vice Chairman Academician B. Kvasil: "At present we are in a situation where the economic evaluation of enterprises does not support the production of demanding, sophisticated instruments. Labor productivity in these cases is judged by the same criteria as for the production of punches. This approach must be altered quickly."

Information which we have recently acquired indicates, however, that things will only begin to look better for our scanning electron microscope in more extensive production. This should be achieved by means of a so-called "free scientific production association," a firm linkage between the Institute of Instrument Engineering and Tesla Brno, for whose creation the new federal Ministry of the Electronics Industry also has great sympathy.

According to the assurances of Corresponding Member A. Delong, our BS-350 microscope, which is undergoing constant improvement, will be at the world state-of-the-art level for at least 10 years. Accordingly, even allowing for delays, nothing has yet been lost. In the interests of our economy, however, it is necessary to create the conditions which would make possible the entry of the sought-after, sophisticated results of our science into world markets and at the same time would also make possible their utilization at home. The prices of sophisticated instruments are increasing rapidly year after year, and our science cannot do without them if it is to continue moving forward.



[Photo caption] The "handsome" BS-350, which is one of the best instrument engineering products we have ever produced, is at the absolute world summit in some parameters. In addition to direct television transmission, it makes it possible to examine a specimen stereoscopically, and by connecting other apparatus, to convert it into an analytical instrument which instantly spews out the precise percentage elementary composition of the specimen.

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POLAND

LONG-RANGE COMPUTER APPLICATION, PRODUCTION DESCRIBED

Warsaw INFORMATYKA in Polish No 9, Sep 80 pp 25-28

[Article: "About Information Science"]

[Text] In Poland information science is an area of growing uncertainty. Although its presence no longer evokes reservations, its achievements are not dazzling. It also turns out that in Poland it frequently is much cheaper to use human labor than to use computers. How, in such a situation, can primitive labor, which exploits man physically, be replaced by modern but very costly computerized information operations?

If decisions to develop information science that is based on the use of increasingly expensive domestic hardware depend exclusively on strict cost effectiveness analysis, then in very many cases the services of computer specialists should have been abandoned. But it is known that such a conclusion is absurd. Many computerized operations can no longer be performed by traditional methods. Information science has brought about fundamental qualitative changes in work methods, and in some work areas it simply cannot be replaced.

Despite development conditions that are not the best, mainly the result of insufficient modern hardware, Polish computer specialists have achieved much. Computers improve management efficiency of most decision links of the national economy; they aid the production control processes in many industrial enterprises, and they increase the effectiveness of scientific, research and development work. The service network of the computer centers of the Information Science Association [ZI] is operating with increasing effectiveness. The gamut of domestically produced computer equipment now includes modern peripheral devices and minicomputers. All in all we now have a potential portending favorable conditions for intensive development of information science.

The need to decrease investment significantly, however, has made it necessary to limit the domestic production and import of computer hardware. Information science is at a critical point because presently planned supplies are not even sufficient to replace worn out hardware. This is a very dangerous trend. Of course, the concern here is not about the specific interests of the over 50,000-strong community of information science people; the concern here is about a fundamental matter--about maintaining Poland in the dynamic stream of modern civilization, about maintaining its status as a member of the community of economically developed countries.

Table 1. The number of computers in Polish computer centers during the 1965-1985 period assuming a 10-year operating period for the computers and that the increase in domestic computer production during the 1981-1985 period will be 50 units annually (during 1981-1982, 20 ODRA 1305 units and 30 R-32 units, and during 1983-1985, 50 R-32 units)

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CDC-[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
CDC-Cyber 72	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
CDC-Cyber 73-16	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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NCR-[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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UNIVAC - [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
IRIS-[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Not long ago Prof Wladyslaw M. Turski wrote (INFORMATYKA, No 1-3/80) that information science methods are a bridge leading to a new stage of development for societies, into a civilization based on information. A country that does not build such a bridge will play a menial role in the future vis a vis important customers. There is no other alternative. With such a rapid development of society (demographic, scientific and so forth), we must utilize the resources of modern information science techniques.

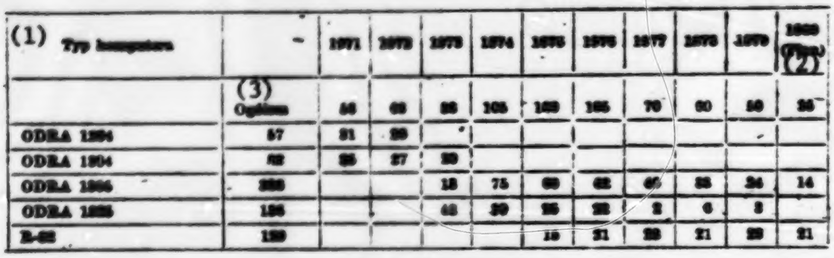
The concern pervading the Polish information science community was one of the motives for calling a plenary meeting on 22 May 1980 of the Chief Technical Organization [NOT] Scientific-Technological Committee on Information Science. Opening the discussion were Dr Janusz Gwiazda, director of the Secretariat of the Committee on Information Science, who delivered the main paper, and Graduate Engineer Zdzislaw Bogdanowicz, director of the Foreign Trade Information Science Center.

These papers and the discussions that followed accented the basis factors hampering the further development of information science. The conclusions will be presented in the form of a document which will include an evaluation of the situation and postulates that the community is addressing to the central authorities. This article is not a formal report of the meeting. Its purpose is to broach the subjects of basic significance for the development of information science in Poland that were discussed at that meeting.

Hardware

Naturally the quantity and quality of computer hardware will decide first of all the results of information science applications. In an extreme situation, the state of things can be such that it would be analogous to "Napoleon's" lack of action.

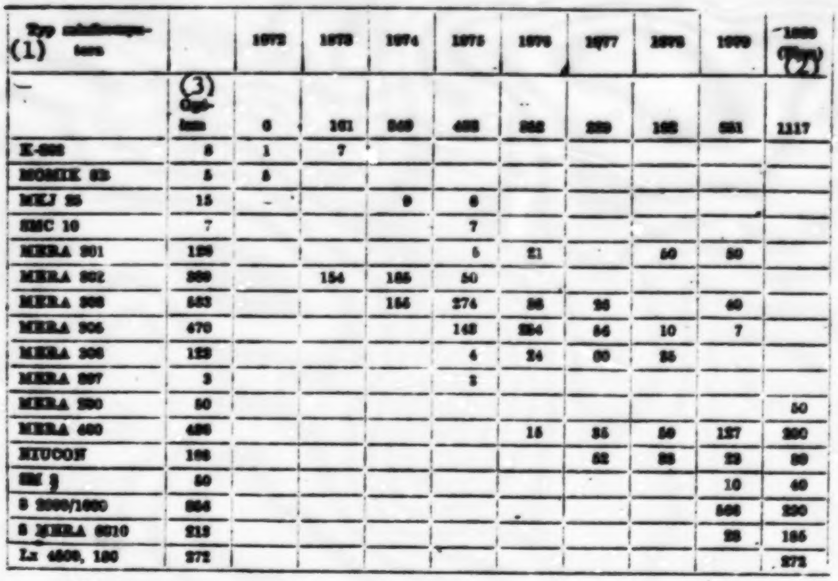
Table 2. Computer production in Poland for the 1971-1980 period



(1) Typ komputera	-	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980 (Plan) (2)
	(3) Ogółem	[illegible]	[illegible]	[illegible]	105	[illegible]	165	70	60	[illegible]	[illegible]
ODRA 1204	57	31	[illegible]								
ODRA 1304	[illegible]	[illegible]	27	[illegible]							
ODRA 1305	[illegible]			18	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	14
ODRA 1325	126			48	[illegible]	[illegible]	[illegible]	2	6	3	
R-32	130					10	31	[illegible]	21	[illegible]	21

Key:
1. Computer type
2. Planned
3. Total

Table 3. Minicomputer production in Poland for the 1972-1980 period



(1) Typ minikomputera		1972	1973	1974	1975	1976	1977	1978	1979	1980 (Plan) (2)
–	(3) Ogółem	6	161	349	488	362	239	198	581	1117
K-202	8	1	7							
MOMIK 8B	5	5								
MKJ 25	15	–		9	6					
SMC 10	7				7					
MERA 301	126				5	21		50	50	
MERA 302	389		154	185	50					
MERA 303	683			186	274	88	95		40	
MERA 305	470				148	254	56	10	7	
MERA 306	123				4	24	60	35		
MERA 307	3				3					
MERA 330	50									50
MERA 400	486					15	85	50	127	200
MIUCON	198						52	33	23	90
SM 3	50								10	40
S 2000/1000	864								586	250
S MERA 6010	213								28	185
Lx 4600, 180	272									272

Key:
1. Minicomputer type 2. Planned 3. Total

The number of computers used in Polish computer centers during the 1965-1985 period is shown in Table 1, which was obtained (as was Tables 2 and 3) from the Foreign Trade Information Science Center. It shows the successive retirement of computers after 10 years of operation and an estimate of the planned number of computers to be produced annually in the next 5-year period for domestic use (50 machines, 15 more than in the current year).*

Table 1 clearly shows the downtrend. There will be fewer and fewer computers. Although the new machines to be introduced will have increasingly greater computing power and their configurations will be more extensive, the quantitative decrease in the next several years, resulting from the necessity to retire many computers, will in effect--as indicated in the discussion--decrease total computing power. Because computer imports over the last several years has been at a minimum, domestic production will determine the extent of supplies. Table 2 shows the number of Polish computers produced during the last decade.

This year's supply of 35 computers will satisfy a little over one-third of the ministries' orders. In the future this disproportion will surely increase since using computerized information methods is simply a necessity defined by principles of the economy. Hindering computerization, especially in the realm of management, can greatly hamper the realization of our economy's main task, namely, to increase efficiency.

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*In light of the increasingly rapid depreciation of computer hardware, especially the drastic price cuts, the assumed 10-year amortization period for computer hardware is now somewhat too long a period from the economic point of view.

Minicomputer production is expanding more dynamically in Poland. The types and number produced during the 1972-1980 period are shown in Table 3. It has been estimated that the disproportions now occurring with medium-size computers are not occurring with minicomputers. However, over the next several years it is expected that the demand for minicomputers and microcomputers will increase sharply. Their export complicates the situation. Some models are not now available for domestic customers and will not be over the next several years.

The intensive export of peripheral equipment also hampers domestic supplies. This popular equipment frequently is not available in Poland. As a result it is getting increasingly difficult to properly complement computers, especially to expand configurations. Of course, such management of peripheral equipment negatively affects current results and further expansion of many applications.

The domestic industry has also mastered the production of some data transmission equipment, such as the 1200-2400 baud modems, interactive and batch terminal equipment and the EC 8371-01 teleprocessing processor. Nonetheless, work on the basic computer network remains far from finished. The expansion and modernization of many computerized information services are a complicating factor.

Increasing the percentage utilization of our computers was the problem most frequently touched upon during the discussion. Presently the average operating period for our computers is 46 percent of calendar time, or 11 hours per day. The main reason, in addition to the lack of precise coordination of computer utilization, is the relatively great unreliability of new domestic hardware, especially during the initial months of operation (INFORMATYKA, No 4/80). It appears--as mentioned with concern during the discussion--that the average time between malfunctions is less than the operating time of a standard program in a given computer center.

The ever increasing shortage of paper, which is needed to feed data into and obtain data from a computer, significantly limits the efficiency of computer operations. Current supplies of paper are often 30-50 percent less than the minimum needs of the computer centers!

Along with the shortage of hardware and operating materials, there is another, no less important problem: the high cost of domestically produced computers. For example, depending on its configuration, the R-32 costs 40-85 million currency zlotys, despite the recent reduction in the prices of the central processing unit. A similar class foreign computer costs much, much less, especially for used models that are being offered in increasing numbers, even if the least advantageous foreign exchange rate is taken into account.

The high price of hardware, which greatly increases the cost of utilizing computers in Poland, is above all--as stated by the representative of the MERA Association of Measuring and Automated Equipment Industry--the result of the technology presently in use in Polish industry. To significantly reduce computer costs it is necessary to use large-scale integration components which are not yet available in Poland. In addition, the average customer's computer equipment is to a great extent obsolete, and planned investment outlays can at most be sufficient only to [illegible] existing technical potential.

The producer is aware of his products high cost and unreliability. He also is aware of the poor service he provides. However, under present circumstances, it is difficult for him to find effective means to improve the situation.

The question then arises: in general is it worthwhile to produce noncompetitive medium-size computers in Poland or would it be better to limit ourselves to narrow specialization in the realm of selected external equipment, minicomputers and microcomputers? The eventual change in our industry's production structure, however, must occur simultaneously with a change in the proportions of computer equipment production, export and import.

Cadres

Total employment in information science is estimated to be 57,000, of which 30 percent are college trained. The level of knowledge and know-how these people have is a fundamental factor (in addition to the amount and quality of hardware) determining the expansion of information science applications.

In accordance with the postulates, during the next 5 years employment will increase by about 10,000 people (about 2,000 per year). It should be noted here that every year about 450 college graduates are information science major. In addition, the technical schools train specialists in related fields, for example, as telecommunications and teleprocessing specialists. In addition to the trade schools, hardware producers and some institutions and associations conduct training in the field of information science on a continuous or sporadic basis. There should be no doubt that the training of new cadres is very important and must keep up with rising demand.

Currently the most important task is to prepare specialists on a long-term basis and not at the level that was current many years ago. This is linked, as it appears, with the reasonable postulate stated by representatives of education that the most modern, foreign computer equipment should be placed at the disposal of the higher schools.

An accurate determination of the structure of future demand for higher educational graduates is an important problem associated with cadre training. Why, for example, increase training of computer designers when, as a result of using integrated circuits of increasing scale of integration, the process of designing computer hardware is becoming simplified? In addition, as I already mentioned, the future of this branch of production is not very optimistic. The realization of detailed accounting of present needs is essential.

Applications

The primary stimulus for information science applications is determined by society's increasing need in this area. Increasing the infrastructure of information science and the number of cadres should be the result of society's awakening needs; it should not be forced by administrative decisions. The further development and extent of applications of information science in Poland in the present situation results more often from existing investment possibilities than from authentic needs. It also is difficult to expect good results from information science applications because the planned computerization of industrial technology or organizational structures precedes information science applications.

Nonetheless, the achievements to date should not be dismissed out of hand. Subsystems incorporated in government systems (SPIS, CENPLAN, PESEL) are already in operation. The first ministerial management systems (for example, in the Ministry of Machine Engineering Industry) as well as many composite element systems and interesting partial solutions have been implemented. Materials management, employment and payroll and accounting systems are used extensively. The number and popularity of very effective programs for scientific and engineering calculations are increasing.

In the last 5 years the applications structure has changed quite markedly. In accordance with current world trends, for example, the share of computerized information methods used to control technological processes increased from 12.5 to 17 percent.

However, the share of applications in the area of services directly affecting social needs (tourism, transportation, trade, postal services, savings banks and so forth) appears to be too small compared to those in the economically developed countries. In Poland information science to date has been applied almost exclusively to meet the external demands of enterprises and institutions.

In the discussion it was stated that one of the most neglected areas of application is the settlement of financial accounts, which is a requisite for the proper functioning of the entire national economy.

One of the observed trends in the world is the continuous decrease in the cost of computerized information services. In consideration of this, ZI published a new price list for its services (INFORMATYKA, No 4/80), lowering existing prices an average of 15 percent. Unfortunately, the high cost of hardware makes it very difficult for other computerized information centers to follow suit.

Coordination

The final item, a matter of fundamental significance, in the list of Poland's information science problems that were touched upon in the discussion is the lack of efficient coordination of its development. Impulsiveness dominates; it outranks plans and guidelines. One gets the impression that no one accepts responsibility in some areas of computerized information. Therefore a new organizational structure must be implemented on a national scale which would protect information science from rigid centralism as well as from decentralized confusion. Timid proposals were presented in this area during the committee meeting.

ZI proposed that the hierarchical system of coordination contain only two levels: central and regional. Central coordination would be carried out by the Committee on Information Science [KI], which was formed in May 1975 by the Council of Ministers, with the Secretariat performing the executive function. The ZI would be responsible for regional coordination, with the local ZETO Electronic Computer Institute (which is most acquainted with the real needs of its region) assuming the role of executory echelon. However, regional coordination should be assumed by an independent institution, one that is not part of interested institutions.

The committee, however disposed toward the function of central coordination, in practice to date has performed as an advisor, having no executory powers. Let us hope that the recent organizational changes in its structure (INFORMATYKA, No 7-8/80) will create a central coordinator by means of a more realistic process.

As soon as possible the committee should publish detailed listings of legal acts, technical standards, and methods of designing systems and software, as well as standardize professional terminology and operating and program-design documentation for systems, and catalogs, as well as classification methods used in information science.

In collaboration with the MERA association, the committee should, among other things, promote the standardization of hardware, the development of effective ways of transferring application software from ODRA computers to Uniform System computers, the designation of methods for creating hierarchical systems based on domestic hardware, and the simplication for the user of the selection of effective hardware configurations.

The committee must also help to resolve the increasingly difficult problem of technical service. The producer himself is unable to do this because--as already explained--the responsible enterprise's value index of output per employee performing service is much less advantageous than for basic production activity. When it is necessary to reduce employment, service personnel are the first to go. In no case, however, should the user organize service internally because from the all-social viewpoint such action is an enormous waste. On the other hand, it would be sensible to create a central service network in the form of a separate enterprise.

An important and urgent task for the immediate years ahead is to create an independent group of experts (perhaps a two-level organization) that would objectively evaluate the preparedness of institutions to implement computerization or the effectiveness of using currently possessed hardware. This would justify decisions regarding the distribution of new hardware. In practice to date there has been a lack of essential objectivism concerning this type of judgment; the special interests of interested parties have always been in the forefront. When distributing hardware, specific preferences for the most important applications should of course be taken into consideration.

Thus the postulate now is: good management and coordination, careful economic analysis before investment decisions are made, a rigorous computer operating mode, avoidance of make-believe actions (designated mainly for statistics), and treating a computer as an instrument and not as a trump card to upgrade one's own prestige. In other words, information science should be treated as proof and not as a proposition.

Knowledge of the civilizing role that activities in information science play can be of help to people in that field in their battle with today's difficulties. As shown best by the discussion during the meeting, which is the basis of the above reflections, everyone realizes its significance. Most of the problems listed here, which for understandable reasons are very general in nature, do not probe the entire labyrinth of real relationships and interdependencies. In future issues of INFORMATYKA we will attempt to fill out the picture outlined here.

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CHEMICAL INDUSTRY MINISTER DISCUSSES PAST, FUTURE DEVELOPMENTS

Bucharest REVISTA DE CHIMIE in Romanian No 7, Jul 80 pp 627-631

[Article by Gheorghe Caranfil, minister of the chemical industry]

[Text] Basic Orientations, Priority Goals in the Development of the Chemical Industry

The magnitude of the renewing revolutionary changes that have occurred since the Ninth Congress of the Romanian Communist Party, as well as the complex and comprehensive achievements that have taken place during this time and have fundamentally transformed our entire economic and sociocultural life, will forever be inscribed in gold in our nation's history as the years of the most daring plans and most fulfilling achievements.

The unprecedented achievements obtained during this stage of fertile and prodigious activity bear the imprint of the profound thinking, innovative capabilities, and clear, scientific, and original vision of the secretary general of the party, Nicolae Ceausescu, the communist who has fundamentally reorganized the progress of our society toward the ever higher peaks of multilaterally developed socialism, and who in fact has raised man and his needs to the rank of fundamental objective for the party's entire policy.

The positive and generous effects of this policy have also been ennjoyed by the chemical industry, which during these 15 years has passed through a process of tumultuous renewal and development.

The demands made of the chemical industry have steadily increased with the country's industrialization and the socialist transformation of agriculture. The development levels of the chemical industry have been determined by its role as supplier of raw materials and materials designed to enhance natural resources in all branches of the economy. Its products have been increasingly numerous and diversified, oriented as they were toward agriculture and animal husbandry, machine construction, electronics and electrical machinery, textiles and leathers, the construction materials industry, glass and lumber processing, land, air, and water transportation, printing, and the motion pictures.

During this one and one-half decades, the investment funds allocated to the chemical industry have grown 4.7-fold, with the major effort being directed toward the creation of Romanian petrochemistry as an extremely important branch of the modern chemical industry. New large capacity units have been built, equipped with advanced technology, and most of the existing units have been developed and modernized.

One of the characteristic elements of the Romanian chemical industry is the outstanding growth of industrial production, with a 7-fold increase in the value of its products during the last three five-year plans.

Correlating the requirements for an equitable territorial distribution of chemical plants, with the general needs of the national economy, investments have been directed toward key objectives, thereby assuring the most economic production concurrent with a larger production and higher labor productivity.

During this period we have built new, high capacity chemical fertilizer combines at Piatra-Neamt, Tirgu-Mures, Craiova, Turnu-Magurele, Navodari, Arad, Slobozia, and Bacau; petrochemical combines at the Borzesti-Onesti, Ploiesti, Pitesti, Rimnicu-Vilcea, Telejean, Midia-Navodari, and Timisoara sites; artificial and synthetic fiber and filament plants at Braila, Savinesti, Iasi, and Roman; enterprises for plastics processing at Bucharest, Buzau, Iasi, and Orastie; the Danubiana tire factory in Bucharest; rubber products enterprises at Bucharest, Pitesti, and Tirgu Jiu; and the pharmaceuticals enterprise in Bucharest.

The more than 1500 capabilities and investment objectives of the chemical industry placed in operation during this period, are an extremely important aspect of the rates and levels forecast and achieved by the Romanian chemical industry.

Of particular interest is the fact that production growth rates in the chemical industry exceed those of the investments in this branch, reflecting the increased efficiency of the new objectives, obtained by means of modern technologies and optimum sizing of new production capabilities.

During the last decade, the chemical industry has consistently oriented its development toward a modern production structure, primarily in the sector that derives the highest values from raw materials consistent with the demands of contemporary technical and scientific progress. During this year for instance, petrochemistry -- the most dynamic sector of the branch -- will provide 60 percent of the value of production in the chemical industry, as compared to 48.7 percent during 1975.

The chemical industry has become a factor of general socioeconomic progress, mainly because it lends dynamism to the production of other branches. It provides the products needed by ultimate consumers -- representing 20-25 percent of the value of its production -- as well as those needed by other industrial branches, agriculture, and social life. The products used directly and indirectly by other industrial branches and sectors of activity, and in manufacturing processes specific to them, represent increasingly higher percentages of the industry's production.

The fulfillment of the extremely important tasks entrusted to the chemical industry workers require sustained efforts for planned production to be completed as such.

To an overwhelming degree, this involves the qualitative aspects of activities, the transformation of quantity into a new quality, which as Nicolae Ceausescu has pointed out, constitutes the primordial foundation of the Romanian industry's future, the future of the entire national economy.

It is well known that one of the important criteria for assessing a level of economic development is the volume of physical production. Significant growth has been obtained for the basic products of the chemical industry as compared to 1965. In 1980 for instance, the growth will be 4.4-fold for 100 percent sulfuric acid, 14.5-fold for 100 percent chemical fertilizers, 8.2-fold for chemical fibers and filaments, 10-fold for 100 percent plastic materials and synthetic resins, 11-fold for synthetic rubber, 2.9-fold for tires, 5.5-fold for pharmaceuticals, 7.8-fold for detergents, 2.6-fold for dyes and organic pigments, 4-fold for lacquers and paints, and 8-fold for cosmetics.

The continued diversification and growth in the production of the chemical industry during the last decade and one-half has increased the exportation of products, which by 1979 had increased by more than 22 times over that of 1965.

Profit increases will be derived both from a higher production of goods, and from a considerable reduction in costs per 1000 lei of goods production. It is illustrative that the economic profit forecast for 1980 alone, is 1.6 times higher than the entire value of the goods production achieved in 1966.

In international economic cooperation activities, efforts have been directed toward the production of raw materials and chemical products that are in short supply, assuring long range delivery especially for groups of low tonnage and highly processed products.

New Modernization Concepts -- Achievements, Qualitative Changes

Together with the high rate of physical production, it has been possible to also achieve a significant increase in the exploitation of the country's raw materials and natural resources. The processing of crude oil into petrochemical products has been expanded so as to assure a high economic efficiency for its exploitation; whereas a decade ago these products represented 4.5 percent of the processed crude oil, this year they will represent 10.2 percent, and are expected to amount to about 17 percent in 1985 as a result the pyrolysis of ethane, propane, butane, gasoline, and kerosene, primarily for the production of polymers, synthetic rubbers, synthetic fibers and filaments, and so on.

Low density polyethylene has been used for various types of high strength and high elasticity films used for coverings, printing, cables, injection products, and so on. High density polyethylene has been obtained from the polymerization of ethylene in suspension.

Another direction of development in this sector has been the production of synthetic rubbers. Two installations for the fabrication of polyisoprene rubber were placed in operation during the current five-year plan, one of which produces rubber through stereospecific polymerization of isoprene, a process based on Romanian research. The range of synthetic rubbers is being expanded with new types such as butadiene styrene rubber, polybutadiene rubber, ethylene propylene rubber, and synthetic latexes based on butadiene. Modern installations have also been recently built for separating butadiene from the C4 fraction through extractive distillation in the presence of selective solvents, to be used in the butadiene rubber installations. Another recent process for increasing the available butadiene, which is currently used industrially, is the oxidehydrogenation of n-butadienes.

The development of the chemical industry and the technologic progress made throughout the world in the field of synthetic and artifical fibers and filaments, fully justifies the development of this production sector in our country. The plant at Savinesti-Neamt has undergone a vast development as a result of the placement in production of three installations for relon-type polyamide fibers, including the production of caprolactame; this plant obtains a wide rage of fibers, such as textile filametary fibers, textured fibers, cotton-type and wool-type fibers, technologic fibers, cord fibers for tires, and carpet fibers. Future plans include a sustained growth in the production of polyamide fiber and filaments, both through the development of the Savinesti plant, and through the placement in operation of a new plant at Roman during this year.

The production of polyacrylnitrile fibers (Melana) has developed into a range of products through the use of a technology worked out at the Savinesti plant, which uses ethylene carbonate as solvent; because the latter is non-toxic, the process is superior to others of its kind. Since 1969, our chemical industry also produces another group of fibers and filaments -- polyesters (Terom) -- at the Iasi plant, which fabricates cotton and wool-type fibers. This production is expected to grow further through the placement in operation of three new plants for polyester fibers and filaments, presently at an advanced stage of construction at Cimpulung-Muscel, Corabia, and Vaslui. More recently, polypropylene fibers designed primarily for technical applications have also been produced at the Iasi combine.

The powerful development of the chemical fertilizer industry in Romania was determined by two essential considerations: the importance of agriculture as a basic branch of Romania's economy, with its favorable conditions for higher productivity through the use of modern agrochemical techniques, and the reserves of natural gas which could be efficiently exploited as fertilizers.

Ammonia is produced mainly in modern, large capacity installations, built mostly with equipment produced in Romania. Urea production lines have also been standardized. A domestic technology was developed for nitric acid, and modern installations are being built as standard ammonia nitration production lines of 1000 t/day, which can equally well produce nitrated lime at various concentrations. A phosphoric acid manufacturing technology was created for the production of concentrated and complex fertilizers; it uses a dihydrate process suitable for the processing of the most diverse types of phosphates. The production of triple superphosphate and of complex fertilizers based on ammonium phosphate was developed, representing the largest portion of phosphorus fertilizer production.

In inorganic chemistry, electrolysis installations using mercury as well as diaphragm cathodes, have been modernized by replacing graphite anodes with activated titanium anodes, thereby reducing electric power consumption, extending the operating life of cells, and reducing maintenance costs.

The trend of the chemical industry has been to stress the development of the fine synthesis and low tonnage sectors, assigning priority to the development of the pharmaceuticals industry with its particular social implications, since drugs play such an important role in maintaining the health of the population.

The development of pharmaceuticals production in Romania has reflected and continues to reflect the same characteristics and trends found throughout the world, with significant growths in the fabrication of active substances, and especially antibiotics, vitamins, chemotherapeutic products, other substances necessary for the protection of the population's health, livestock support products, and goods for the rapid development and considerable expansion of economic exchanges in world trade. Also notable is the trend to reduce dependence on major producers by reducing the importation of active substances; this has been made possible because the Romanian pharmaceuticals enterprises have developed integrated and comprehensive productions, specializing in therapeutic groups so as to assert themselves on the world market in the respective domains.

The drug production of previous and the current five-year plans also reflect the stages crossed by Romania as a developing nation; the major characteristic of the 1965-1975 period has been the priority development of the pharmaceuticals conditioning sector, which moved from the laboratory phase to the phase of modern, mechanized, and automated industry, and the development of the synthesis of active substances so as to gradually reduce importations.

The current five-year plan has seen a qualitatively superior leap over the preceding five-year plans, insofar as it has achieved priority development in the production of fine and intermediate synthesized active substances.

The industry of cosmetics, perfumes, scents, creams, and lotions, as well as of household and confort chemical products has undergone a considerable growth in recent years, determined by improvements in the quality of life and the demands of human existence.

The production of cosmetics and household chemicals in Romania has been part of the country's dynamic economic development, the objective factors in this growth having been the rapid increase of the population's real income and its level of culture.

The 1970-1975 period saw the creation of the cosmetics industry as a sub-branch of the chemical industry, as well as the transition to a coordinated production in the field of household chemical products.

The development program for the 1976-1980 period foresees a 2.7-fold increase in the value of the production of cosmetic products and household chemicals. The cosmetics and perfume production will increase 2.57 times for an average annual growth rate of 20.8 percent, and the production of household chemical products will increase 3.6 times for an annual rate of 29.6 percent.

During the last decade, the organic synthesis industry underwent a powerful development, complementing the profile of the chemical industry with a wide range of products of practical use in all modern industrial branches, which also satisfy the needs of the market at an increasingly civilized level.

Another outstanding achievement of the organic industry has been the production of a range of alkylamines as intermediate basic products for a number of herbicides and for other organic syntheses. The range of these products will be expanded to enable the continued development of a selection of pesticides for agriculture.

The production of detergents has also grown significantly during the last decade, with older types being replaced by new, biodegradable types. It should be pointed out that all the detergent production technologies were developed by our own research institutes, and that they were constantly updated in industrial installations.

The great accomplishments of the chemical sector during the last 15 years, the most brilliant ones in the entire history of Romania's economy, were made possible by the effective and efficient support of scientific and technical research. The Central Institute for Chemical Research (ICECHIM) was founded in 1970, to group all departmental research institutes, research centers and laboratories of centrals and combines, as well as the research activity in higher education institutes and schools. This organization, based on a modern scientific concept, was established under the direct leadership of academy member, doctor-engineer Elena Ceausescu, and has sought to coordinate all the scientific research in Romania and to concentrate its forces on all the major problems of this research.

The technical research at all the experimental installations operating within large chemical plants has been placed under the jurisdiction of the Central Institute, leading to the integration of chemical research in industrial activities.

As a result of the great efforts made to organize and develop the research and design sector, as well as of the direct guidance and special attention devoted by the party and state leadership to this sector, most of the current production in the chemical industry is obtained in installations designed on the basis of research pursued in our country, particularly in plastics, synthetic rubbers, fertilizers, pesticides, pharmaceuticals, detergents, dyes, and chloro-sodium products, all of them decisive areas for assuring material and technical progress in industrial and agricultural production.

The research units in the chemical industry and in specialized higher education have made outstanding contributions to the achievements and development of the petrochemical industry. This has assured technologies for all monomers and basic products, such as ethylene, ethylene oxide, ethylbenzene, styrene, propylene, propene oxide, glycols, acrylonitrile, vinyl chloride, phenol, acetone, butadiene, formaldehyde, vinyl acetate, and so on.

The existence of these products assures continued development in the production of plastics and synthetic resins, synthetic fibers and filaments, synthetic rubbers, and low-tonnage specialized products for other industries.

The manufacture of synthetic rubbers is a most important domain for the entire economy. With this in mind, outstanding achievements have been made by the research collective of ICECHIM, led by Elena Ceausescu, in obtaining stereospecific elastomers and in solving theoretical problems in kinetics and synthesis, fundamental research problems that have opened a wide horizon for creating new types of elastomers, preparing and purifying monomers, synthesizing specific catalysts, studying structures and relating them to physical-mechanical properties of polymers, establishing methods for stabilizing the polymers obtained, and so on.

Another of ICECHIM's concerns has been the production of the ethylene-propylene copolymer, a rubber which has become popular throughout the world because of its numerous applications. These types of synthesized polymers have properties similar to those available throughout the world, and the technology adopted is at the level of the best ones known in industrially developed nations.

In the plastic materials sector, ICECHIM and the research collective of Borzesti have tested and perfected technologic processes for obtaining general purpose polystyrene, using larger capacity reactors.

One outstanding achievement is the development of grafted shockproof polystyrene, and of a technology which will be industrialized in a large capacity installation.

ICECHIM has also succeeded in synthesizing biphenol from phenol and acetone. An industrial installation for biphenol was recently placed in operation using solely domestic raw materials and ancillary products. Biphenol is important as the major intermediate ingredient in the manufacture of epoxy resins, polycarbonates, phenoxyl resins, antioxidants for synthetic rubber, and so on.

In the chemical fertilizer area, work has been done to obtain new types of organomineral products which in addition to nitrogen, phosphorus, and potassium, also contain natural and synthetic macromolecular organic substances. Tests have shown these products to be superior to mineral fertilizers. Other types of fertilizers -- foliar ones -- are offered in liquid form, and in addition to nitrogen, phosphorus, and potassium, contain a wide range of microelements (Ca, S, Zn, Fe, Cu, Mo, B) in the form of complex salts.

Part of the contribution of scientific research to the development of the chemical industry has been the concern for reducing energy consumption, and for economizing energy intensive raw materials. Research in this direction has been oriented toward improving existing technologies, or replacing older ones with modern approaches.

Particular attention has been devoted to research in the most advanced fields of chemical technology -- industrial microbiology, molecular stereochemistry, and the chemistry of fine synthesis to obtain high purity and semiconductor materials.

During this time, the chemical industry has consistently oriented its development toward a modern production structure, primarily in sectors which return the highest value from raw materials, in accordance with the demands of modern technical and scientific progress. This explains the large effort made in pharmaceuticals, dyes, cosmetics, intermediate materials, pure and extra pure metals, all of which significantly increase economic efficiency.

The rate of development of the chemical industry has also imposed the adoption of modern technologies and the perfection of existing ones so as to increase economic efficiency.

Keeping in mind the progress achieved throughout the world, high capability installations have been built using modern technologies. In order to reduce the importation of technologies and to increase domestic contribution to the completion of the development program, efforts have been made to organize and develop the research and design sector aimed at creating Romanian processes. As a result, the production of pharmaceuticals, pesticides, and dyes was developed entirely on the basis of domestic research.

Programs have been formulated for the complex exploitation of raw materials, and recoverable or reusable materials are increasingly being utilized.

This information indicates that the chemical, petroleum, and petrochemical industry is making rapid strides in technical improvements, consistenly using new and modern technologic processes in which research, design, and chemical engineering play a decisive role.

New Requirements for Modernizing Production and Increasing Efficiency

The workshops recently held in Bucharest with responsible groups in the economy, are part of the systematic and constant concern of the party and state leadership to find the most appropriate solutions to the problems that are facing our society in its upward path, for the efficient exploitation of the entire material and human potential available to it. In his extensive speeches, Nicolae Ceausescu has undertaken a profound analysis of some of the fundamental problems in economic activities, and of the growing role of party and state organs in managing the entire society and in the achievement of the plan in industry, agriculture, and other economic sectors. In the spirit of a high sense of responsibility toward the destiny of the country and his own communist drive, starting with the shortcomings that have arisen during this period, the secretary general has established a number of concrete tasks, the major directions for action, the paths to be followed, and practical solutions for improving activities, so as to rigorously achieve economic and social objectives.

Those of us who work in the chemical industry have enjoyed the constant personal guidance and support of Nicolae Ceausescu, at last year's workshop with the ministry's Management Council, during the visits he made to industrial and research units, as well as on the occasion of the frequent analyses he conducted of the most important aspects of our activities.

Following these contacts, all workers in the chemical industry have moved to obtain greater value from material and financial means, and to increase the efficiency of production, investments, and exports. These occasions have also strengthened our confidence in our ability to overcome the difficulties and hardships with which we were confronted.

During this period, the Ministry of the Chemical Industry has conducted an intensive activity to fulfill the provisions of the 1976-1980 five-year plan, the decisions of the 12th Congress, and the decisions and guidelines offered by the party and state leadership.

Given the vast investment program allocated with priority to the chemical industry during the current five-year plan, and which will continue to be allocated in the future, as well as the efforts made to increase labor productivity at existing facilities, the next five-year plan will achieve an average rate of growth of 10.9 percent for net production, 9.8 percent for total production, and 15-22 percent for product groups with extensive processing. The physical production provisions will assure 95 percent of the domestic demand for major product groups, and the production per inhabitant will equal that of developed nations.

The higher value of chemical products per ton of raw material, reduced energy consumption, and the assurance of an average rate of growth of 8.2 percent for labor productivity, will reduce total and material costs in 1985 by 10 percent with respect to 1980.

In order to complete fully and on schedule the comprehensive tasks assigned to the chemical industry for this year and for the future, and in the light of the indications given by the secretary general at the workshop devoted to activity improvements, a special program has been formulated to concentrate the workers' efforts on the following priorities:

Assure the continued operation of current installations at planned parameters, especially in petrochemistry, fertilizers, and basic inorganics, by strictly respecting technical discipline, general maintenance, and periodic repairs. The goal will be to manufacture the necessary spare parts primarily in units of the Ministry of the Chemical Industry, with only specific items to be provided by the Ministry of the Machine Construction Industry;

Hasten the placement in operation of investment plan installations, by assigning priorities according to current project status, preparing investments for the next five-year plan on time, and giving urgent priority to the 1981-1982 period;

Reanalyze installations in terms of energy and fuel consumption, so as to massively reduce these consumptions, and invest new funds to increase the proportion of products that are highly processed and consume little energy, such as pharmaceuticals, cosmetics, low tonnage products, dyes, lacquers and paints, and chemical reagents;

Expand the standardization of installations and equipment in the chemical industry, together with a more extensive introduction and use of domestic research, original Romanian processes, and standardization of chemical products, so as to reduce production costs and rationalize the use of chemical products in all branches of the economy;

Fully and totally use secondary products;

Eliminate accidental shutdowns and assure the continued operation of installations through reinstruction and verification of workers' training. Insistence will be placed on strict respect of technical discipline and manufacturing parameters;

Significantly increase labor productivity through expanded mechanization and automation of manufacturing processes, while raising the level of professional qualification.

The application of the objectives planned for the next five-year plan and for the future will determine the progress of all areas of socioeconomic life. During the ninth decade therefore, the chemical industry will find itself quantitatively and qualitatively at the level of economically developed nations. Thus will this branch contribute more fully to the fact that by 1985 Romania will move beyond the stage of developing nation, and to the fulfillment of our order's supreme goal, the radical improvement of the entire nation's living, material, and cultural conditions.

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CSO: 2702

DEVELOPMENT OF NONFERROUS, RARE METALS METALLURGY STUDIED

Bucharest METALURGIA in Romanian No 5, May 80 pp 263-265

[Article by Prof Fl. Oprea, Polytechnic Institute, Bucharest]

[Text] Characterization of Technologies for Obtaining Conventional Nonferrous Metals

The growing demand for nonferrous and rare metals, and the nature of domestic raw materials, has imposed the need for improvements and constant adaptations of the technologies used to obtain nonferrous metals and alloys. At the Copsa Mica Metallurgical Enterprise for instance, as part of the ISP (Institute for Studies and Design) process, air is preheated to 1000 °C by means of a heat exchanger in which the purified furnace gas is burned together with another fuel, thereby increasing the melting intensity by about 20-25 percent. At IMMN (Metallurgical Enterprise for Nonferrous Metals) Baia Mare, improvements made to the suspension melting process (charge preparation and homogeneization, higher air preheating temperature, and so on) have increased the melting oven capacity by about 15 percent, and much higher productivities are currently expected from the use of oxygen-enriched air.

More than 10 types of fluxes for formulating and modifying special aluminum alloys have been devised at the Slatina plants, and the possibility of automatic quenching of anodic effects has been verified industrially. The Laromet and Neferal plants in Bucharest have introduced high-strength bronzes containing aluminum, used in truck construction, and deformable bronzes used in the production of 4000 hp engines; they have also established a technology for manufacturing the Cunial alloy (for casting ship propellers) and the Cu-Ag alloy needed to fabricate crystallizers for continuous steel casting installations.

The development of nonferrous metallurgy has therefore been strongly influenced by the nature of the available raw materials, because the growing demand for nonferrous metals and alloys has imposed a comprehensive utilization of all valuable components.

Romania's raw materials base for the production of the major heavy nonferrous metals -- Pb, Cu, Zn, Au, Ag -- consists of ore concentrates of these metals, these concentrates being the finished products of the nonferrous mining sector. For instance, low grade sulfurous copper ores will be increasingly used, since modern technology makes it possible (with higher investments) to exploit ores with up to

Table 1. Increase in the proportion of low grade concentrates over high grade concentrates in the metallurgy of Pb and Zn.

Types of concentrates	1970	1971	1973	1975
Sum of selective Pb and Zn concentrates and of higher grade collective Pb-Zn concentrates (%)	100	100	100	100
Sum of Pb-Zn concentrates contaminated with Cu and Fe (low grade complex concentrates) (%)	26.0	45.6	56.3	64.0

0.50 percent copper content. The major mineral content of these ores is chalcopyrite ($CuFeS_2$), often associated with chalcocite (Cu_2S), with lead, iron, and zinc compounds, as well as with gold and silver. The ore is floated, obtaining sulfurous concentrates which are processed metallurgically.

The silver present in these ores is found in the native state or alloyed with other metals (Au, Pt, Cu, Hg), and as sulfates: argentite (Ag_2S), proustite ($Ag_3As_2S_3$). In the Baia Mare region, polymetallic ores contain Cu, Pb, Sb, Au, and so on. In these ores, gold is found in a native state and in the form of combinations (with pyrite and chalcopyrite, and more seldom with blende or galena). Similarly, gold is found in polymetallic ores as well as in combinations, as selenides and tellurides. Gold is separated from alluvials by washing, and from native ores or from silver by amalgamation (dissolution in Hg) or cyanuration (dissolution in cyanides); from polymetallic ores or in gold combinations, this element is extracted by pyrometallurgic processes, followed by liquation and electrolysis.

Given the chemical composition of Romania's nonferrous metal ores (complex compounds of lead, copper, and zinc sulfates, with sometimes remarkable impurities of Sb, Bi, and As) and their physical and chemical-mineralogical properties, the quality of nonferrous metal concentrates produced by the mining sector and currently processed by the chemical-metallurgical sector, is different from that of concentrates obtained elsewhere. If to this specific aspect of our concentrates we add the large amount of auriferous pyrites which must be processed to extract gold (in combination with lead or copper concentrates the pyrites generate large quantities of slag), we can understand the particular technology and the different extraction yield obtained for Pb and Cu in Romania as compared with other countries.

For the optimum exploitation of the metal contained in ores, the selection of new metallurgical processing technologies has attempted to create for the mining sector, conditions for achieving superior extraction yields as early as the ore preparation phase, by changing from selective flotation to collective flotation for some ores (Ruschita, Baia de Aries, Baita-Craciunesti-Muncelu). From a quantitative standpoint, a higher production of heavy nonferrous metals will be achieved in Romania through the exploitation and processing of complex deposits such as the one at Lesul Ursului, whose mineralogical characteristics are unique in the world, the copper deposit of Rosia-Poieni, or the one in Banat at Moldova Noua. For this reason, the proportion of complex concentrates obtained from ores of the Lesul Ursului type in recent years has been increasingly large. Table 1 shows the relative increase during the 1970-1975 five-year plan, in the production of lead-zinc collective concentrates containing copper and iron, as compared to the cumulative production of selective concentrates of lead, zinc, and higher grades of Pb-Zn collective concentrates (Pb+Zn, 55 percent).

Table 2. Chemical composition of pyrite ashes and of the iron ore which can be obtained from their processing.

Material	Average chemical composition (%) Fe	Cu	Pb	Zn	As	S	Mechanical resistance kg/pellet
Pyrite ashes	55	0.8	1	1.8	0.3	2.1	
Iron ore (pellets) from processed ash	57	0.04	0.03	0.03	0.03	0.04	100-150

The final processing technology for such concentrates must take into account the simultaneous presence of the three useful elements (Cu, Pb, Zn), which behave differently in physico-chemical processes, and of iron, which is a particularly troublesome impurity. The new technology must make it possible to directly obtain zinc and copper as metals of first extraction, as well as a copper matte. Industrial tests conducted at the melting installation of Copsa Mica ISP, have shown that the lower grade of complex concentrate requires special conditions in the furnace because the risk exists of not collecting the copper in the form of matte, while forming large quantities of slag which greatly reduce the extraction yields of all three metals.

Currently, these concentrates will be processed by melting in furnaces with short baths. Because this technology also has the drawback of producing Pb and Zn in the form of oxides, which imposes intermediate steps for processing the oxides into metals, research must be continued in Romania to perfect a technology which will assure the extraction of the three metals (Cu, Pb, Zn) from complex concentrates of the Lesul Ursului type, at superior levels and with the lowest possible costs.

Another source for expanding the base of domestic raw materials for the production of zinc, lead, copper, and other elements, is the pyrite ashes stored in the slag heaps of H_2SO_4 plants, and those that are being formed from current production. The processing of 500,000 t of pyrite ashes per year alone, will yield about 6000 t of nonferrous metals and about 450,000 t of iron ore (in pellet form) for steel production. The optimum technology for utilizing these materials had to take into consideration the particular physical characteristics of Romanian pyrite ashes: very fine granulation and high arsenic content.

Because the majority of the metals exploitable from pyrite ashes are in short supply in the national economy, and because their importation raises problems of currency and of foreign sources of supply, the processing of pyrite ashes was particularly essential. The new Turnu Magurele plant handles these materials by the Kow-Seiko Japanese process, which consists of treating the ashes with $CaCl_2$ and calcinating them to volatilize As and nonferrous metals in the form of chlorides (which are subsequently processed hydrometallurgically), while the residue is agglomerated to be used in steel manufacturing. Table 2 shows the chemical composition of pyrite ashes and of the iron ore in pellet form, which can be obtained from these materials.

Also in order to increase the base of raw materials in the production of lead, zinc, and copper, it is necessary to process the slags stored and currently being formed at ISP melting installations, since they contain significant amounts of useful and exploitable materials. The current stage of research in this domain, for slag flotation and electrothermal melting, or for the Fuming process, indicates the possibility of future investments.

Because these slags are stored above ground, and because their Zn+Pb content (8-9 percent) is higher than that of the same metals in ores, they present economic processing opportunities.

Aluminum is the metal whose production in Romania during the 1970-1980 period increased most rapidly. This development of aluminum metallurgy in Romania implies exceptional tasks to assure the raw materials base.

Bauxite is currently processed at the Oradea plant and at a larger, modern plant in Tulcea, which takes advantage of sea and river transportation. Both plants use the Bayer process, which requires bauxite with a maximum content of 5-8 percent SiO_2 (or $\eta_{SiO_2} \geq 10$, where $\eta_{SiO_2} = Al_2O_3/SiO_2$).

During the last world war, aluminum was obtained in Romania only at two insignificant installations in Tirnaveni and Bucharest. After the energy base was assured, it was possible to begin the construction of a large and modern aluminum plant at Slatina, where diverse aluminum products are extracted and processed. The aluminum production meets the domestic consumption demand and provides a certain amount for exportation.

Since aluminum production will intensify in the future, and since the countries that have bauxite deposits (primarily emerging nations) tend to do their own alumina extraction and processing into primary aluminum, problems associated with the raw material will become more acute. Under these conditions, efforts will be made to use poorer quality bauxite and other materials with a lower Al_2O_3 content than that of bauxite: ashes from thermal generation plants, bituminous shale, nephelines, and so on. Research to exploit our own raw materials must therefore continue at the Oradea plant, which operates an installation to study processing technologies for raw materials with low alumina content, in order to establish design parameters for new industrial installations which will process non-bauxite materials by the end of the present five-year plan.

Extraction of Rare and Scattered Materials

The production of rare metals in Romania has grown significantly during recent years, and their level of recovery from base metal subproducts is satisfactory; the major metals produced at the end of the 1975-1980 five-year plan are: Mn, Mo, Bi, Sb, Cd, In, Se, Te, V, Ge, and Ga.

Industrial level research conducted at IMMN in Copsa Mica, has made it possible to double the amount of technical cadmium produced through recovery from the water used to wash conditioned gases, and from the electrical filter in the agglomeration department at the ISP installation.

IMMN in Baia Mare is operating an industrial phase of a technique for processing volatile dusts resulting from the copper concentrate suspension-melting installation, which will also significantly increase the production of cadmium, indium, and selenium.

In order to diversify production and to satisfy the growing demand of other industrial branches for rare metals, special alloys of rare metals, semiconductors, and materials which are currently in short supply, research has been conducted with domestic raw materials; future organization has been outlined for a large production of rare metals such as germanium, silicon, indium, and Sn-Sb, In-Sb, In-Al-Ga, and other alloys of semiconductor purity; and plans are being drawn for a new industrial enterprise for ultrapure metals, a new department for the production of high purity selenium and tellurium, a department for the comprehensive utilization of scattered rare materials (In, Ge, Tl, Cd) and the exploitation of Bi and Sb, as well as a department for obtaining lithium and and lithium salts.

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11,023
CSO: 2702

FIRST ELECTRIC DRILLING INSTALLATION MANUFACTURED

Bucharest STIINTA SI TEHNICA in Romanian No 6, Jun 80 p 6

[Article by C. Nedelcu,"F-200EC, the First Romanian Drilling Installation with an Electrical Drive"]

[Text] The installation helps to improve the performance in the following fields: reduction of specific consumption per unit length drilled; increase of the rate of drilling; reduction of physical stresses; raising of the level of technical safety and reduction of the time needed for assembling, transporting and dismantling of the installation.

We called on Comrade Engineer Valeriu Patrascu, of the staff of the General Directorate of the Petroleum Industry, to describe this type of drilling installation, the design and manufacture of which was motivated in particular by the need to save the conventional fuel (and in particular, the liquid fuel) per unit length drilled; he was kind enough to describe to us some of the principal technical features, and to indicate the economic efficiency of the installation. The following elements were involved in the design of this new type of installation: mounting of the winch on the bridge of the derrick, being able to assemble it on the ground; lifting it by folding; building the elements of the installations in large compact units which can be dismantled for transportation; driving the winch, the rotary table and the pump by means of 850 kW d-c motors, fed by the 660V a-c busbar through three-phase rectifiers, controlled at a complete thyristor bridge.

This is the first domestically designed and manufactured drilling installation, in which electrical devices (diodes, thyristors, etc.) are used to control high-power electric motors; as our interlocutor told us, this achievement is the result of "one of the most important tasks assigned to us by the Twelfth Congress of the Romanian Communist Party, asks us to ensure the rapid development of the supply of raw materials for industry and research, by the inclusion of new products with improved characteristics, by the automation and computerization of the production, by introducing an advanced, new technology into all branches of production, in particular into the extractive industry, in order to reduce markedly the consumption of raw materials and energy.

The electrical supply and drive of the derrick consists of several units which are arranged as follows: a 20/0.990 kV - 2 x 2000 kVA transformer, constructed from prefabricated units; two sled-mounted supply stations for control and adjustment, each of which contains two modules of the driving mechanism of the two 850 kW d-c motors. The equipment of a driving module is mounted in four closets. These devices carry out the following functions: a-c input; a-c d-c converter, including the thyristor-controlled rectifier; the automatic speed control and adjustment of the electric motor; the d-c supply of the electric motors.

In addition, the electrical installation contains also four d-c, type MCF-800 explosion-proof electric motors, with the following characteristics: nominal power - 850 kW; nominal induction voltage - 770 V d-c; nominal induction current - 1200 A and nominal rate of rotation of the winch - 1100 rpm. The drilling winch is driven by two motors, and the other two drive independently a 3 PN-1000 type single-action mud pump. Another item of the electrical system consists of the electric power supply panel for the internal services and lighting of the installation.

The whole installation is controlled and checked centrally by the drilling supervisor from a control bench.

The F-200 EC installation is also provided with instrumentation to determine and control the principal drilling parameters, and with mechanization unit (such as, a device to measure the load at the hook, and the pressure at the scoop, a device to measure the torque at the drill pipe; instrumentation to measure the rate of rotation of the rotary table, and the number of double pump strokes; pneumatic winch for pulling, handling tools and materials on the derrick, a device for screwing the feed pieces).

At the present time, the prototype of the F 200 EC drilling installation operates with excellent results at a depth of 4,000 m at the "Brincoveanu" structure in Dimbovita county. Once this type of installation is approved, it will be possible to start the large-scale manufacture of the F 100, F 125, F 320, F 400, F 500 and F 800 type electrically-driven drilling installations, which present great technical and economic advantages in comparison with the heat-actuated drilling equipment (oil driven combustion motors), specifically, by lowering the fuel usually consumed per unit length drilled by 20 to 30%, increasing of the drilling rate by 10%, and reducing the physical stresses in the drilling equipment.

These new types of electrically driven drilling equipment which may be used at depths down to 4,000 to 10,000 m, is the fruit of the efforts of work collectives consisting of young specialists, including the following:

Elena Lepedatu and Viorel Ghita of the ICPE, Bucharest, Viorel Cristea and Andrei Gheorghe of the IPCUP, Ploiesti, Eugen Chitucea and Paul Stavarache of the ICP "Electroputere" - Craiova, Victor Vilvoi and Victor Caraman of the "1 Mai" Ploiesti.

It is planned that during the next Five Year Plan period (1981-1985) 40% of the total of the drilling installations of the OGAPG will be provided with this type of electric drive. Specifically, the units will be manufactured at the "May 1 Ploiesti", "Electroputere Craiova" plants, and the Baneasa Enterprise for Radio Parts and Semiconductors.

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CSO: 27C2

DEVELOPMENTS IN AERONAUTICS INDUSTRY DESCRIBED

Bucharest STIINTA SI TEHNICA in Romanian No 6, Jun 80 p 15

[Article by Teodor Chirica, Engineer, Technical Director, National Center of the Romanian Aeronautical Industry, Ministry of Machine Building Industry, entitled: "Aeronautics - the leading branch of the machine-building industry"]

[Text] The existence and the stage of development of the aeronautical industry represent one of the fundamental indicators for evaluating the technological level of the economy of a country.

The historic decisions of the twelfth congress of the Romanian Communist Party which include at a prominent place, the directives concerning the economico-social development of Romania during the 1981-1985 Five-Year Plan period, together with long-range forecasts up to 1990, underline the scope of intensive development of the process industry, pointing out the headlong rate of the means of aerial transportation, of the aeronautical industry.

The last fifteen years have been chiseled in the consciousness of all of us who were active in the field of aeronautics as a period of giant economic effort, aimed at creating means of research, design and production, permitting our country to regain the fame that it possessed in this area a few decades ago. This new stage represents the most fruitful period of development of Romanian aviation, filling us with pride, while indicating at the same time, our total commitment.

The aeronautical industry in Romania was relaunched as a branch of the machine construction industry, and was brought to its present level of prominence thanks to the continued concern of our party and state leadership, and the personal interest of Comrade Nicolae Ceausescu.

After its reorganization in 1968, our aeronautical industry started from its modest existing means of production, able to ensure partial repairs of airplanes and motors of the stock of our aircraft industry and a very small-scale production of gliders and light utility planes.

As a result of the thus created situation, the available specialists were brought together in a relatively short time and a college-trained new staff was created with the assistance of the Department of Aeronautics of the Polytechnic Institute of Bucharest, the production capacity was developed and suitably supplied for the efficient manufacture of aircraft, including jet engines and mechanical units for helicopters, in intermediate and large series on the basis of our own design, was started in cooperation with others for export on on the basis of licenses.

This activity was initiated a decade ago with the design and construction of the special-purpose IAR 93/ORAO-type jet engine, carrying a "Viper" motor manufactured under license by Rolls Royce both in Romania and Yugoslavia, in cooperation with the specialized Yugoslav industry.

From the specific and technological viewpoint, the aeronautical industry possesses a foundation worthy of attention: our aerodynamic installations are at the level of those of anybody else in the world; we fabricate and employ aircraft components possessing nonconventional structure, including carbon fiber finish; we are manufacturing hydropneumatic equipment, on-board computers; we are getting ready to produce alloy pieces from romanian titanium, we are producing certain categories of equipment and on-board instrumentation, etc.

The experience of the Romanian aircraft constructors was considerably broadened by cooperating with prestigious foreign firms; for example, we manufactured BAC 1-11 aircraft components for the British Aerospace Company, about which the Director of Manufacture of BAC, Peter Renson, stated: "the units manufactured in Romania, even the items difficult to fabricate, such as the stabilizer, cannot be distinguished from those manufactured in England (Flight International, March 15, 1980). The license constracts with SNIAS for jet helicopters, and with Turbomeca (for motors) and the numerous general aviation Pilatus Britten-Norman "Islander" airplanes manufactured in Romania, have a similar implication; the very high construction rate of the Soviet trainer IAK-52, on the basis of a long-range cooperative agreement is another example of this.

A cursory examination of the long-range plans of the Romanian aeronautical industry reveals the following: in the first place, the rate of manufacture of all products - civilian and military aircraft, their motors and other equipment, will be increased specifically by improving the labor efficiency, while making sure that the quality needed for flight safety is safeguarded; in the second place, the production capacity will be developed and the technological preparations for the manufacture of new types of aircraft, including the intermediate range airplane BAC 1-11, and its motor Spay 512, in cooperation with the British Aerospace and Rolls Royce Companies, will be completed, enhancing the degree of integration of the products by incorporating into our own manufacturing schedule a wide range of devices for aircraft systems and motors, of half-finished high-precision cast and forged products; in the third place, a highest level specialized production and research facility will be established on the basis of the Baneasa aircraft industry, fulfilling the long-range concepts of the president of our country, Comrade Nicolae Ceausescu. Having opened up for ever the gate for collaboration, our aeronautical industry, in addition to the acquisition of specialized top-level products and technologies, will continue to extend its export of aeronautical products.

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ROMANIA

DEVELOPMENTS IN COMPUTER INDUSTRY

Systems Reviewed

Bucharest STIINTA SI TEHNICA in Romanian No 7, Jul 80 pp 19-21

[Article by Dr Engineer Emil Tudor, deputy scientific director of the Research Center for Computer equipment: "Computer Technology: A Field in Full Development"]

[Text] Necessity and Possibilities

The encounter with the electronic computer occurred after World War II. It is a lasting encounter, with extensive socioeconomic implications, and it is far from evident in all its aspects. The future will be characterized even more strikingly by the potentials of the electronic computer, especially in controlling the production processes.

The problems that man can no longer solve by traditional means, either because they are too complex or because it would take far too long to solve them, are handled by the means and methods of computer technology. Electronic computers' precision, operating speed and capacity to process a huge volume of data provide man with an immense power to resolve his scientific, economic and industrial problems.

Any rational activity is conducted according to a model, which determines the data of the problem, the operations performed, and the ways of checking the results. The model consists of a series of elementary operations which, in the form of a succession of orders peculiar to a given type of computer, constitute the computer program.

The computer's performances in solving problems according to the program are vast. The processing unit performs hundreds of thousands and even millions of operations per second, the accessory equipment introduces and extracts data with thousands and tens of thousands of characters per second, and the capacity of the external memory units reaches millions and billions of characters. For example, the average speed of the Romanian FELIX C-256 computer is about 170,000 operations per second, while that of the FELIX C-512 computer comes to 300,000 operations per second. The advantage of electronic computers in solving problems requiring a huge number of operations is self-evident.

In its evolution, computer technology first pervaded the field of scientific research and then reached the economic and industrial units. In its present stage it is a feature of people's daily lives, thanks to technological progress in the field of components and manufacture of integrated circuits on a very large scale and microprocessors. Pocket calculators that are much more accurate and convenient than slide rules are being profuced, as well as household appliances like cooking and washing machines controlled by microprocessors. Microcomputers and minicomputers control stoplights and installations for posting train arrivals and departures, record plane reservations, sales and stockpiles in big stores, etc. The possibilities of applying computer technology to all activities are virtually unlimited.

Progress of Computer Technology in Romania

In Romania, the electronic computer industry started in 1968 and showed a very high growth rate. The output of computer equipment was 10 times greater in 1978 than in 1972 and is planned to be 4 times greater this year than in 1975.

The enterprises in the computer industry are producing a varied assortment of computer systems, accessory equipment, and terminals to equip the data processing sectors in all sectors of the national economy.

The computer industry accomplished its tasks by combining international cooperation with development based on Romanian research. In the 1971-1975 period products manufactured with a license predominated, and then the proportion of the output based on Romanian research increased to about 60 percent in the 1977-1980 period.

The products developed by Romanian researchers and assimilated in production have had a number of impressive successes abroad as well. For instance, the INDEPENDENT-100 minicomputer was internationally approved in 1978 under the agreement between several socialist countries concerning minicomputers, and the FC 64 invoicing and accounting machine was awarded the gold medal at the Plovdiv International Trade Fair in 1977.

A wide variety of accessory equipment can be attached to the universal computers of of the FELIX family, in combinations with a great many applications.

The FELIX C-256 medium capacity system and the FELIX C-512-1024 medium-high capacity system operate with 58 Mocteti magnetic disc units, magnetic tape units having 1,600 bpi and a speed of 75 inches per second, card scanners processing 800 cards a minute, rapid printers processing 1,200 lines a minute, teletransmission terminals and other kinds of accessories. The computers have operating systems for multiprogramming, teleprocessing and real time operations.

Two models, the INDEPENDENT-100 and the CORAL-4011, out of the family of Romanian minicomputers have been placed in manufacture. Both types of minicomputer have a modular structure and a wide range of applications. Two operating systems for minicomputers have been developed for this purpose, the adjustable multifunctional system for a disc (AMS) and the real time system (MINOS).

The system for introducing data with a minicomputer (SIDM) was developed to prepare data in the computer centers and to relieve the main machine of a number of incoming-outgoing operations. This equipment makes it possible to introduce data at specialized operating stations and to assemble, check and organize the data in card indexes on magnetic tape with 1,600 bpi. The magnetic tape can then be used for other computers.

The SIV-2400, another device for introducing and verifying data on flexible magnetic discs, permits replacement of card scanners, punches and verifiers. In addition to the processing unit, the device includes an alphabetical-numerical key [tastatura], a flexible magnetic disc unit, and a printer.

To perform financial-accounting operations, the economy benefits by a complete family of FC 16/32/64/96/128 invoicing and accounting machines developed through Romanian research and manufactured by the Bucharest Electronic Computers Enterprise.

The computer industry also manufactures other kinds of equipment such as posting devices, card scanners, printers, magnetic disc units, magnetic tape units, etc.

Accordingly Romania now has an industrial and research potential in the field of computer technology that can meet all the needs of the national economy.

Prospects

The computer industry is still an extremely dynamic one, and the growing importance of this equipment in all socioeconomic activities is conspicuous. This dynamism is illustrated very well by the sales of microprocessors, which came to about 3 million units in 1978 and are expected to reach about 30 million units in 1982. Since these microprocessors are used in various computer systems and equipment and need accessories, there will be an equally explosive increase in the output of accessory equipment.

The microprocessors and widely integrated circuits permit decentralization of the computing power and its distribution where needed, resulting in changes in the design and organization of the data processing systems that modify the technical-economic requirements for the processing units and the accessory equipment. The new systems and equipment for small-scale data processing must be better adjusted to the concept of distributed data processing.

Applications are increasing to a very great extent. It is estimated that there are over 25,000 of them. This inevitably leads to greater efforts to develop programs for the new systems and applications.

Notable progress is expected of the industrial robots, which will take over man's laborious and dangerous tasks. This progress is based upon microminiaturization and advances in computer technology.

Incorporating in a small space memories, microprocessors for performing several operations, optical scanning organs, and sensors for recognizing objects, the robots weld, paint, assemble machine parts with great precision and replace human labor in the production processes that require higher qualifications.

In most countries development of computer equipment is controlled by national programs. In Romania the developmental program for the 1981-1985 period calls for a high growth rate of 2.3-2.4 times for computer equipment, maintaining this sector of Romanian industry at the highest quotas, those specified for the peak sectors. The computer industry will provide for the entire domestic requirement for systems and equipment, a constantly growing export trade, rapid modernization of the computer systems in step with their worldwide evolution, increased production of distributed and long-distance data processing systems, and preparation of all the necessary basic and applied programs.

Automation Prospects

Bucharest STIINTA SI TEHNICA in Romanian No 7, Jul 80 p 2

[Article by Eng A. Predoi, director of the Scientific Research and Technological Engineering Institute for Automation, Computer Technology and Telecommunications: "Progress and Prospects of Automation"]

[Text] On the threshold of the spirited effort to acheive the objectives of Romania's socioeconomic development in the 1981-1985 Five-Year Plan and the long-range objectives up to 1990 (a period defined as "the decade of science, technology, quality and effectiveness") and at the crossroads with the accomplishments and fulfillments of the 1976-1980 Five-Year Plan ("the Five-Year Plan of the scientific-technical revolution"), our institute is reviewing 20 years of activity in automation, the 20 years since the word and deed "automation" were inscribed for the first time in the history of Romanian industry on the pediment of heat engineering.

The review of the 20-year period in the service of automation combines the picture of the events in the Romanian people's social progress with the steps on the vertical of the events in the electrotechnical and electronics industry and the stages of the constantly rising "generations" of the industry producing automation elements, equipment and installations, products of Romanian thought and efforts in the human and sometimes superhuman conflict between necessity and reality.

After the Automatica Enterprise with an output of several million lei in 1961 and reaching tens of millions of lei a year in 1965, when imports were over 52 percent, new units (Bucharest FEA [Factory for Automation Elements], Bucharest Electrotehnica, Birlad IEPAM [expansion unknown] and Bucharest FCE [expansion unknown]) appeared with products of a new "generation" of automation and electronics compatible with the process computers of the Felix, Independent and Coral generation, peak creations of Romanian computer technology and products whose value in 1980 will be over 90 times greater than in 1965 and will meet over 92 percent of the domestic requirement.

Passing through the "generations" characterized by the components used, the automation means have developed since 1965, proceeding directly to the second generation and reaching generation 3.5 in the present period. In this succession of generations, scientific research, technological development, and introduction of technical progress were combined with systematization, specialization and typification of the elements, equipment and systems and with applications to industrial equipment and installations in continuous and successive, slow and rapid processes in all sectors of the national economy. Accordingly in the acknowledged present period of computers, directly characterized by the impact of microelectronics and the aggressive penetration of microprocessors, the introduction of overall automations has presupposed and required intensified automation, centralized control, and long-distance data transmission and processing through the introduction of process computers.

The new and modernized products in the automation field assimilated in this five-year plan amount to 55 percent of the value of the output as compared with the 40 percent planned for industry as a whole.

Assimilation of the new products and the modernizations were effected 90 percent through Romanian designs and technical and technological solutions on the current level of technology in general, using semiconductor components of medium density and integrated on a wide scale, as well as microprocessors and subassemblies that led to the creation of elements and equipment in generation 3.5, in compact, miniaturized design and with low internal energy inputs. These do not require air conditioning for their installation or operation, which simplifies constructions and lowers the outlays for investments, maintenance and operation. Design of these elements and devices led to production of unified and standardized systems and subsystems compatible with similar products of foreign firms, namely the SEROM system (95 basic types) for processes in chemistry, energy, and metallurgy, the variators and transformers system (over 170 basic elements) for operations in metallurgy (in rolling mills) and machine building (machine tools), the NC and CNC systems of the NUMEROM type (over 35 basic types) for control of machine tools and metallurgical equipment, the USILOG I, USILOG E, SEMNAL S and SEMNAL I static commutation systems for electronic devices for automatic control of some processes and assemblies in chemistry, metallurgy, machine building and power engineering, the systems for control of the processes with computers of the FELIX C-32 P and ECAROM, INDEPENDENT-100 and CORAL families for production lines in chemistry, power engineering, machine building and the construction materials industry (cement factories), and the TELEROM system (comprising 24 basic types) for long-distance data transmission and processing.

In the electronics-electrotechnical sector, a proportion of over 10 percent is specified for automation means, with an increase in the contribution of Romanian research to 75-80 percent in the 1985 period and the 1990-2000 horizon.

The main directions and objectives of research and development that will ensure approximation to the level of the developed countries and alignment with the medium countries are wide-scale introduction of microprocessors and other electronic components developed so as to produce a major gain in the performance-cost ratio, improvement of quality in order to enhance reliability through treatment of the program problem of the production flow and the computerized facilities for automatic testing, and forecasting of new unconventional systems of automation applications. The latter include man-computer dialogue systems, automatic systems with self-diagnosis, automation and data transmission systems with lasers and optic fibers, automation systems for exploiting new energy sources (nuclear, solar, wind, maritime and geothermal, and automation systems to increase productivity of extraction, transport and storage equipment and that of the drilling fields for petroleum and gases.

Moreover, introduction of new and modernized manufacturing processes like those for making multilayered interwoven cabling(manufacturing cycle shortened by at least 40 percent), flexible cabling (material inputs reduced 50 percent), flexible flat cabling with self-support (productivity increased by 50 percent and heat welding processes completely eliminated) and transmission of signals through optic fibers (consumption of copper and electric power reduced by 70 percent), and the control systems with stationary buttons and switches instead of the electromechanical ones will make it possible to double the output volume in 1985 with material and energy inputs averaging 50 percent less and about 60-65 percent more manpower than in 1980.

The program for research, technological engineering and production of automation means, which is based on the above-mentioned directions, objectives and elements of economic effectiveness, is correlated with the other programs of the Ministry of the Machine Building Industry (machine tools and equipment and metallurgical and power engineering construction materials for the light and food industry), and it is estimated that it will meet the domestic requirement by 1985, while the expected levels of automation according to ministries and industrial sectors will reach figures comparable to those of the developed countries.

Moreover in the 1981-1985 period emphasis will be placed upon standardization of compact, miniaturized solutions with reduced energy inputs, providing for complete integration of automation and computer equipment in the technological assemblies and devices of the systems of machines and equipment standardized for the technologies in the main industrial sectors (metallurgical, chemical, machine building, construction materials, power engineering and other industries) and that of the special programs of vital importance (energy, nuclear, marine drilling, mining, transportation and other programs).

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CSO: 2702

SWINE BRUCELLOSIS TO BE ERADICATED BY THE END OF 1980

Bucharest REVISTA DE CRESTEREA ANIMALELOR in Romanian No 6, Jun 80 pp 30-33

[Article by Dr. I. Predoiu, Institute for Veterinary Research and Biological Preparations, and Dr. N. Visarion, Veterinary Health Directorate of the Ministry of Agriculture and Food Industry].

[Text] The current methods of industrial-scale swine husbandry require that the animals of the units be free of any kind of disease.

Raising animals while operating in large, specialized enterprises started several years ago in Romania pointed out the disadvantages caused by the existence of brucellosis, an infection which renders more difficult the process of upgrading from the viewpoint of management, raising, protective measures and profit making.

In order to accelerate the rate of benefication of the land, the known means of combatting the disease were studied and analyzed, adopting original solutions which suit the domestic methods of swine husbandry.

The conventional methods which were considered or adopted throughout the world were listed and checked; this made it possible to rank them and to select the principle for our own studies. The history of the fight against this disease yielded several methods which were used but subsequent experience has proven most of them to be ineffectual.

The many experiments to find an active biopreparation for specific prevention remained unsuccessful. Killed or live vaccines alone or in association with immunostimulating adjuvants, did not provide a satisfactory protection, so that at present, no vaccination of the swine is practiced anywhere in the world.

As far as therapy is concerned, the many investigations for treating humans revealed the "in vitro" sensitivity of Brucella to various antibiotics; however, because of the habitat of the germ, a curing dose in vivo results only in a bacteriostatic effect without a sterilization of the organism. In view of these findings in more of the countries, are the animals of consumption treated because the methods are ineffective, expensive and result in restrictions for using the meat as food.

In view of the fact that vaccination and treatment were found to be ineffective, the fight against the disease forced most of the countries with well-established animal raising industry to turn to administrative methods and to measures of veterinary hygiene, based on the principle of the improvement of the sanitation in the infected farms and the protection of those which have not yet been affected.

Two paths were followed on how to improve the sanitary conditions of the farms:

(a) removal of animals found to be suffering from brucellosis, as detected by repeated checkup tests, in conjunction with disinfection and other hygienic measures;

(b) sacrificing the whole herd and starting anew with healthy stock.

The first, obviously more economical formula, did not eradicate the disease in the units. Young animals, or carriers, which did not exhibit any reaction in the diagnostic tests, passed on the infection to the subsequent generations. The method that was found to be the most efficient and less expensive, as checked in many cases, was the slaughtering of all animals, taking disinfection measures, followed by a waiting period and introducing healthy animals.

As far as the diagnosis of swine brucellosis is concerned, it is well known that it presents problems, especially at the preclinical stage, because of certain species-specific features in the behavior.

It was found that in young animals, the tests based on a complex examination have a clearly limited usefulness.

The presence, or the absence of infection at a farm may be verified in general on the basis of the following elements:

- epizootic investigation, covering the last one to three years; emphasizing the examination of possible contacts with the outside, or the importation of animals from the outside;

- clinical data - abortions or other reproduction disturbances, orchitis, chronic mastitis, arthritis, abcesses, locomotary disturbances (suspicious situation);

- serological examination by RAL and RFC, carried out with selected samples using an adequate technical accuracy;

- allergic reaction, especially with mature or old animals;

- bacteriological examination of the abortion products or of other pathological material (decisive response).

A comparison of the results of the above methods, and in case of uncertainty, repetition of some of the tests, allows to confirm or exclude the infection. It should be kept in mind that treatment with antibiotics during the final period of gestation, may prevent proving the presence of the causative agent in cultures or in direct smears; similarly, the serological examination in swine represents the effective diagnosis, and a corroboration of the partial agglutination data with the complement fixation results checked systematically, raises the confidence level.

Reaching a diagnosis is of decisive importance because it is the starting point of a series of sanitary measures.

During thelast decade, great progress has been made in Romania in lowering the incidence of diseases in swine.

The high-priority goals of the national program for the development of animal raising industry and for increasing the animal production include the eradication of this diseases from the farms by the end of the 1980s.

The plan developed for this purpose was based on certain conditions which favor a cooperative effort, carried out in the following manner:

- production rates in agriculture and animal husbandry were increased, together with the number of qualified professionals; this provided the needed material and technical infrastructure;

- the creation of a network of veterinary health institutes and laboratories based on the counties facilitated the execution of preventive, diagnostic and counteracting measures within each of the areas, including the properties of the state and cooperatives and individually owned ones;

- the level of equipping the farms with needed public services was further raised; these services included the mechanization of certain operations, running water, sewers, fencing, tools, large disinfecting units, etc.

The adopted principle of counterattack consisted of the improvement of the sanitation at the infected farms and protecting the affected animals; the activity was organized according to the administrative territorial units of the county.

The first stage involved the creation of a map which indicated the distribution of the disease in the country. In the counties in which the infection was found to be present, the healthy or infected state of each unit was determined on the basis of a complex set of examinations, clarifying the situation and simultaneously classifying the farms into one of the above two categories, or as insufficiently known ones. Depending on the size and quality of the stock, a ranking urgency for sanitation measures was developed, both for the counties and for the units within the counties. Enterprises which were known to be unaffected and able to supply breeding stock, were so certified.

The sanitation measure consisted in stamping out. All breeding was stopped, then the whole stock was sacrificed; sanitation measures (DDD) and retooling were carried out and the farms were modernized followed by repopulating the heard with healthy breeding stock. As the number of large farming complexes increased, the total replacement with breeding animals was carried out without difficulty.

In order to eliminate all possible external sources of infection, compulsory control measures were introduced also at the privately owned pig farms, checking the breeding activity in this sector.

Every year measures of veterinary sanitation, check-up, quarantine and circulation control were developed on the basis of the technical plan; they helped to eradicate the centers of contagion.

The factual proofs of the advantages resulting from the beneficiation the direct technical communications and journal articles helped to promote the sanitation process.

The stated goal, that swine brucellosis in the farms will be eradicated by the end of 1980, is about to be reached.

The fact that there are still certain farms with a previous history of the disease in some of the counties does attract the attention of the central and county officials, and required sanitary measures will be undertaken as soon as the local economic conditions allow it.

The stage that has been reached is the result of the excellent cooperation between the professionals and the leadership involved in this effort.

The researchers brought together and made available the scientific information which included the best approach to solve the problem; specialists at various levels of expertise adapted, coordinated and simplified them, the laboratory personnel took care of the diagnosis, leaving the staff of the farming units and the county network in charge of the operation. The role of the central and district officials, who adopted the proposed program and assisted in carrying it out, should be pointed out.

At the present phase when the process of freeing the farms from this disease is about to be completed, certain facts learned from the experience should be emphasized.

There is still potential for disease which could contaminate again the farms; it could start in individually owned pig farms, which may not be under veterinary control, or in certain wild animals, especially the wild rabbit, other members of the rodent family which carry and transmit the pathogenic agents, by passing through the border.

Certain outbreaks during recent years in healthy farms have proven that all this is still a real danger.

The large, ever-increasing number of big farms points to the high responsibility to keep them healthy, knowing fully well that the only solution is slaughtering of animals.

This justifies the strict protective measures and the professional vigilance, established in these large farms.

The supervisory provisions of the action plan must be carried out in totality together with the instructions and regulations issued to cover the special environment. These rules are applicable for a long time after the last case has been identified.

The continued need for control and check-ups is, furthermore, due to the fact that we are one of the large producing countries of this type of meat. We are among the fastest growing industrial units, thus, as the rate of import-export activity increases, there are many new means to introduce the germ by means of vehicles.

The close connection between the professional, technological contributions and the leadership, and the experience gained, guarantees that the fight against swine brucellosis will end with the expected result.

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JPRS 77072

29 December 1980

EAST EUROPE REPORT

SCIENTIFIC AFFAIRS

No. 690

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INTERNATIONAL AFFAIRS

BLOC STUDIES OF SOLAR ACTIVITY REPORTED AT POTSDAM CONFERENCE

East Berlin BERLINER ZEITUNG in German 15-16 Nov 80 p 13

[Article by Dr Hanns Rainer Lehmann: "When Does Our Sun Produce Great Activity?--Potsdam--An International Center for Planetary Geophysics"]

[Text] In a "year of maximum solar activity" the Tenth Consultative Conference on Solar Physics took place last month in Potsdam. Approximately 100 scientists from six socialist countries discussed the investigation and scientific prediction of solar activity. The central institute for solar-terrestrial physics, i.e., the Heinrich Hertz Institute, was host on behalf of the National Committee for Geodesy and Geophysics of the GDR Academy of Sciences.

Two observatories of this institute in the GDR are investigating those parts of the sun's rays which can penetrate the protective layer of the earth's atmosphere and reach the earth's surface. These are the Observatory for Solar Radioastronomy near Tremsdorf, south of Potsdam, and the Einstein Tower Solar Observatory for visible solar rays. Other divisions of the institute investigate the effects of the sun's rays on the outer magnetic field and the earth's upper atmosphere.

For a long time Potsdam has been an internationally known center for solar research: the first systematic solar observations were already being carried on there more than a hundred years ago. At that time the construction of the astrophysical observatory on Telegraph Mountain was not yet accomplished. Through construction of the Einstein Tower 60 years ago and of the radio-observatory 25 years ago, the Potsdam solar physicists acquired powerful observation equipment which led to interesting discoveries and internationally esteemed research findings.

Consultative conferences on solar physics have been taking place for more than 15 years in the participating socialist countries. The conferences have produced a steadily growing number of agreements between the institutes of various countries to work out joint research projects.

Effects on Radio and Air Traffic

The most important theme of the most recent conference in Potsdam was a scientifically based forecast of solar activity. This forecast is important not only for basic research, but also currently for practical applications.

Strong fluctuations of solar radiation, which occur in particular during great solar flares, can destroy radio traffic and thus endanger air traffic. Secondly, it is possible that cosmonauts may be exposed to life threatening radiation while working in outer space. There is, moreover, proof of the effects of solar activity on weather, climate and biological processes.

The presentations at the Potsdam conference showed that even today, as in meteorology, statistical methods were being worked out which make possible a prediction of "solar weather." In that way the results of many years' observations of the sun are used for the derivation of empirical rules.

A Whole Chain of Measuring Instruments Set Up

But reliable forecasts will only be possible if we better understand the physical processes in the active areas on the sun. These areas involve limited regions on the sun's surface which exhibit especially strong magnetic fields. But the complicated interaction of these magnetic fields with hot, electrically conducting solar gas is the cause for the manifold occurrences of solar activity.

The investigation of the underlying physical laws is at the center of present and future cooperation. At the conference in Potsdam it was said that that refers to theoretical research projects as well as coordinated observation programs. The chain of solar magnetographs, that is, of equipment to measure solar magnetic fields, which includes the observatories from Potsdam to Vladivostok, serves as an example for these programs. This chain is directed from Potsdam. It has been working successfully for several years.

PHOTO CAPTION

A modern microwave spectrograph was installed in Tremsdorf near Potsdam in cooperation with Soviet scientists.

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BRIEFS

CSSR COMPUTER EQUIPMENT FOR USSR--The Industrial Automation Plant in Prague-Kosire [originally called KRIZIK] has delivered their 50,000th FS 1501 photoelectric punch tape reader to the USSR. The reader acts as a "brain" in various computer systems, mainly in data processing, programmed machine tooling, printing and textile machinery, etc. A top quality electronic product, the reader is one of the most important components in the complex industrial robots. ZPA Kosire [Industrial Automation Plant in Kosire] will become a concern enterprise as of 1 January 1980. [Prague LIDOVA DEMOKRACIE in Czech 25 Nov 80 p 1]

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NEW ACHIEVEMENTS IN PHOTOPROCESSING TECHNOLOGY

Sofia RABOTNICHESKO DELO in Bulgarian 4 Nov 80 p 4

[Article by Vasil Simeonov: "A Challenge to the Theory"]

[Text] Several decades ago in the theory of the photographic process, the prevailing hypothesis was one termed the Gurney and Mott theory. It assumed that the light attack on the photographic material, usually silver bromide, led to a photochemical reaction related to the formation of a free electron and another particle which in the language of solid state physics was termed the "hole." There is no need to go into details as the theory explained very well the behavior of phenomena in photography, even though it "rested" predominantly on the photoelectrons. The "photoholes" or "photospecks" were passed over in silence, and almost nothing is known of them.

Precisely here appeared the first Bulgarian challenge to the theory. Prof Yordan Malinovski created an original method for the quantitative recording of the neglected "photo-holes." This made it possible to determine all the parameters characterizing the relationships of these particles in the silver halides, the basic material of classic photography. The obtained data forced a revision of the existing notions of the mechanism of the photoprocess, and led to the creation of a new theory or a new system. This is generally recognized at present, and its popularity can be seen from the fact that its basic conclusions are quoted in every work related to the theory of photography.

We come now to the second Bulgarian challenge to the system. Only this challenge was actually aimed not at any scientific hypothesis, but rather at a practice at those times in our scientific activities. Practical applications for the new theory were being sought. Because in photography 10-15 years ago, major problems began to be discussed including the depletion and greater cost of silver (the basic raw material for photographic emulsions), the need for new, special photographic materials designed for microelectronics, and so forth. Also further developed were the ideas concerning the essence of the photographic process, the nature and size of the latent image and its relationship to the development processes. The Central Laboratory for Photographic Processes under the Bulgarian Academy of Sciences was founded as an independent scientific unit.

The scientific contributions by the coworkers from the laboratory would take entire pages to list, but to everyone it is still known as a research unit which has given serious attention to the practical aspects of scientific achievements. The light-sensitive systems developed in the laboratory on the basis of vacuum-vaporized thin layers of silver and silver-free compounds have disclosed new technological possibilities for producing photographic materials with exceptionally high qualities. Therefore, the obtained results from the scientific research, in starting from the first challenge to the existing hypothesis, have been directly related to technology, to the high demands of modern microphotography, photorecording equipment and the needs of electronics. This can also be seen from the realized and patented methods for obtaining a directly positive photographic material on the basis of silver-arseno sulfide, for obtaining photographic materials based on silver-free light-sensitive compounds, and for synthesizing several pure silver halides.

Precisely this useful and direct link between scientific research and the opportunities for its practical realization provided an opportunity to move on to the next stage, the introduction of the new production methods of special photographic materials, as well as their semi-industrial application in the laboratory itself. And if we must give several specific examples in this regard, we might merely leaf through the jubilee collection of the laboratory published on the occasion of its 10th anniversary. Here are the development of the flexible printed cards for the permanent memory of the EIM-1022; the flexible connecting cables in the electronic calculators produced by the Office Equipment Plant in Silistra. The laboratory has developed and put into regular operation lines which carry out the vacuum-vaporizing of the new photographic material. The silver halide layers which possess a number of technological and functional advantages for the needs of microelectronics also are gaining technological realization at the laboratory. To these activities we must also add the development of equipment for producing chromed plates (only for microelectronic purposes!), as well as the developed method of synthesizing certain super-pure substances.

Few academy institutes can be praised for such a broad "technological program." Precisely here is to be found the force of that second challenge to the standard theory. But does not this aspect of the daily activities alter the balance between science and technology in favor of the latter? The proof of an optimum balance this time will not be found by compulsory quantitative criteria such as the number of scientific publications, citations in texts, defended doctoral or candidate dissertations, or participation in congresses and sympsiums. The laboratory has enough of these "assets." We will not "count" the awards, diplomas, certificates or gold prizes as there is a sufficient number of them. But when the recognition, spontaneous and unforced, comes from "scientific competition," then proof of the necessary equilibrium is at hand. Seven years ago, the first international symposium was organized on model research on the photographic process. Recently the second symposium on the same subject completed its work. Foreign guests had an opportunity not only to read their papers and listen to statements by coworkers from the Central Laboratory for Photographic Processes. They visited it, and became acquainted with its unique facilities and equipment. For them the praising comments were no pro forma statement, and many already will link Sofia and Bulgaria with vacuum-vaporized thin layers.

In the area of photographic science, Bulgaria is a leading country. And one of the reasons for this is the bold challenge to the convenient cover of routine.

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CZECHOSLOVAKIA

PROSPECTS FOR USE OF LASERS IN CSSR MEDICINE DESCRIBED

Prague JEMNA MECHANIKA A OPTIKA in Czech No 9, Sep 80 pp 235-238

[Article by Eng Dr Antonin Novak, Candidate of Sciences, Natural Sciences Faculty, Palacky University, Olomouc: "Current Status and Prospects of the Use of Lasers in the Biomedical Fields of the Czechoslovak Health Sector"]

[Text] 1. Introduction

A series of important discoveries in quantum electronics, which have led to the development of the quantum optical generator--the laser--date from the beginning of the second half of the 20th century. Thus far the laser has been able to expand virtually all the areas of human activity in which it has been studied and applied, and we may say that its further utilization is proceeding steadily. This is also the case in the medical disciplines. While 10 years ago only the applications of lasers in eye surgery were well known, today there is a considerable number of applications in a wide range of biomedical fields, and not only in experimental work, but in clinical practice as well. At the same time it should be borne in mind that unified instrument systems with full control and regulation of laser radiant energy are just beginning to be developed in the medical field, while in other areas of science and technology lasers are already an indispensable tool for improving both the production process and the characteristics of the final product.

In view of the fact that the laser in all its modifications offers great promise for further development and improvement of all the medical disciplines, and also because noteworthy results have already been obtained abroad not only in experimental work but especially in clinical practice, the First National Seminar on the Use of Lasers in Medicine was organized. This seminar, which is the only one of its type thus far in Czechoslovakia, was held on 2-3 April 1980 with the effective cooperation of the Tesda Valasske Mezirici national enterprise. The seminar received a great response from more than 150 physicians from various health organizations throughout Czechoslovakia. In addition to hearing specialized lectures and communications from technical workers who have already begun work with laboratory animals using lasers, the conference participants also saw a demonstration of the first Czechoslovak laser scalpel, which uses a CO_2 laser and which because of its ease of operation and its unique articulated arm, with a set of cutting instruments, can bear the most rigorous comparison with foreign products. Czechoslovak components bases were used exclusively in its production, and its introduction into production currently depends on approval by the relevant offices in both ministries of health (Czech and Slovak).

Since the results achieved with the first Czechoslovak laser scalpel in experimental animals have been so conclusive, the delegates called upon the organizing board of the seminar to make a request on their behalf to the highest representatives of the two ministries of health and the representatives of party and state organs that they grant an exception and allow the beginning of clinical practice with the first Czechoslovak laser scalpel in the No 1 Surgical Clinic of the Faculty Hospital in Olomouc, where a group of doctors led by Docent Miroslav Tomsi, MD, Candidate of Sciences, has already conducted and analyzed a number of experiments on experimental animals using the first Czechoslovak laser scalpel. These doctors are prepared to begin clinical practice and to train additional physicians from other organizations in Czechoslovakia. It would truly be a great national economic and moral loss if the lengthy discussions on introduction of the first Czechoslovak laser scalpel into clinical practice resulted in the halting of further work on this device, which would certainly produce a negative effect on the enthusiasm and work initiative of the research group in the Department of Precision Mechanics, Optics and Optoelectronics of the Natural Sciences Faculty, UP [Palacky University] in Olomouc, which developed the laser scalpel and has applied for a Czechoslovak patent.

To allow consideration of the problems discussed and the scope of the seminar, a collection of contributions has been prepared. This gives the best possible overview of the broad scope of the use of lasers in medicine, of the current level of work with lasers by certain organizations in Czechoslovakia and of the further prospects and possibilities for using Czechoslovak lasers in clinical practice.

2. Previous Biological and Medical Applications of Lasers Abroad

Currently the basic question worldwide is not where it might be possible to use lasers, whether in surgery, dermatology, gynecology, eye surgery, stomatology, urology or in biological laboratories, but what advantages the more complex applications of laser radiation have over standard, classical and sometimes obsolete methods. The following capabilities should be considered as demonstrable advantages of the laser over the ordinary scalpel, thermal and electrical cautery, the ultrasonic generator and cryotechnique:

1. The laser makes possible noncontact, sharply delimited cutting of tissues with various photooptical properties. If thermocoagulation occurs, as in the case of the CO_2 laser in the infrared region, this only affects a narrow margin of cells, depending directly on the density of the incident energy and the focusing of the beam over time (Richfield, Goldman, Gamaleija and others).

2. The microthrombotizing effect stops bleeding from vessels within a diameter of 1 millimeter, with a poorer effect in arteries than in veins. The technique of micropatching with thrombin that has been developed gives excellent results, however, even in incisions of parenchymatic organs. Here the results in "bloodless" operations are far better than with standard methods, particularly in liver resection and the like.

3. With modern lasers it is possible to regulate simply and reproducibly the depth of penetration of the laser ray into the tissue, in direct proportion to the intensity of the laser radiation and the exposure. It has been possible to design

for shifting of the focus of the incident laser beam, as well as to introduce various micromanipulation systems such as operating microscopes with a guiding ray from an He-Ne laser and with a cutting beam from a CO_2 laser, and the like.

4. Healing of incisions compares very well with normal collagen restitution after incision with a knife, and is significantly better than for the carbonizing electrocoagulator or cryocautery (Kaplan, Schoenberg, Aronoff, Beck and others).

The most recent references in the foreign technical literature (Aronoff, Goldman, Kaplan, Karpenko, Ascher and others) stress the advantages of CO_2 laser as a cutting instrument--a scalpel, while the Neodymium-YAG laser appears to be best for coagulation, the pulsed ruby laser or argon laser for dermatology and so on. A certain leading foreign clinical organization has several types of such laser devices which it uses, for example, in various combinations or in alternation, depending on the nature of the experimental or clinical application.

Also of importance is the development of basic biological research on laser interaction with living tissue, even at the subcellular level. Microoperations on dividing cells in tissue cultures with disruption of individual chromosomes and effects on the genetic code are currently being studied by certain important foreign laser laboratories (Bessis, Rounds and others). Currently the permeability and reflectivity of various tissue components as functions of different variables are being studied by many laser laboratories in foreign universities, as are temperature (with various levels of blood flow in supplying arteries), pigments with large selective radiation absorption, the rate of tissue metabolism, ionic equilibrium in body fluids and the like.

Applications of high power lasers in cancer surgery have received differing evaluations. But operations on various malignant tumors of the digestive tract have already produced certain results, particularly use of the CO_2 laser for the removal of various soft components with tumor infiltration, as reported by a number of important surgeons (Kaplan, Galaleija, Aronoff, Beck and others).

In neurosurgery (Ascher, Steller and others) the results of operations on various tumors have been quite unambiguously improved by the simultaneous excision and evaporation of the altered tissue by means of lasers, with effective exhaustion carried out by means of an ultrasonic exhauster. Certain hemangiomas cannot be removed without excessive bleeding except by the use of the continuous wave laser.

This brief survey of world developments does not end with the area of dynamic capabilities of lasers, such as in X-ray radiation, molecular holography, laser spectroscopic microanalysis, the use of evacuated lasers in the ultraviolet region for separation of the DNA helix and so on. Its use in operational areas currently runs up against general ignorance of progress in these procedures, high purchase prices and the technological complexity of current sophisticated lasers. On the basis of the results obtained with Czechoslovak lasers, it is a realistic suggestion that in our health field too they might make possible more extensive application of lasers in clinical practice in all areas, with a severely critical attitude, but without an unhealthy conservatism.

3. Experimental Results Obtained with the Czechoslovak CO_2 Laser Scalpel

Of all types of laser radiation, that from the CO_2 laser has the most favorable properties for use in surgery, since it operates at a wavelength of 10.6 microns in the far infrared region. This makes possible rapid absorption of the laser radiation when it strikes living tissue; in practice, when it passes through tissue 150 microns thick, a beam from the CO_2 laser loses 95 percent of its energy.

During 1979 we verified certain published results of foreign laser laboratories with experimental animals (pigs and dogs) using the first Czechoslovak laser scalpel with its CO_2 laser. We carried out incisions of the skin, the subcutaneous layer and the muscular parts of the abdomen, and resection of the liver, the spleen, kidney stomach, and large and small intestines, as well as resection of lung parenchyma, of the arterial system and of cartilage. We can state on the basis of the overall results that the area of carbonization after incision is minimal, healing of wounds is excellent, and all laparotomies and thoracic incisions healed per primam [directly, without the intervention of granulations], regardless of whether the primary suturing is done only in one layer or layer by layer. Postoperative treatment of experimental animals was carried out in the veterinary hospital in Olomouc. Intestinal resections were carried out on the experimental animals without advance preparation of the intestinal tract. The resectioned segment measured 10 cm, and anastomosis was carried out in all cases with atraumatic suturing and in one layer. All anastomoses were found to heal completely. Identification of the location of the operation was made by nonabsorable marker sutures. The passage through the anastomosis was complete, and no cases of exitus in the experimental animals as a result of dehiscence of the anastomosis were found.

We also examined resected livers or their resected surfaces, after preliminary resection and subsequent coagulation by a nonfocusing beam. The cut surfaces were completely healed, without subsequent or immediate hemorrhage.

In order to check the CO_2 laser in gynecology, and particularly to determine the effect of radiation from the CO_2 laser on uterine tissue, we did joint experimental work with the Obstetrical and Gynecological Clinic of FN [Faculty Hospital in Olomouc on uteri obtained during abdominal hysterectomy. This involved myomatotic uteri with slight changes in the cervix which had not previously been treated by another method. All of the preparations were subjected to histological investigation after irradiation with the CO_2 laser, and the results completely confirmed the important qualities of CO_2 laser radiation, and the ease of operation and high quality design of the Czechoslovak laser scalpel, which makes it possible to change the end manipulator during a surgical procedure. A special tip manipulator of the laser scalpel assures safe treatment of cervical defects, thus assuring patient safety.

In this connection we should note that the group of workers led by Z. Naprstek, M. D., Candidate of Science, at IKEM in Prague, had tested laser radiation in experimental surgery during the 1970's, but at that stage the conditions did not yet exist for the development of the initial Czechoslovak laser scalpel.

Based on experimental applications of the Czechoslovak CO_2 laser scalpel already carried out, it has been stated that the CO_2 laser is suitable for selected surgical procedures and that it complements the classical scalpel, over which it has a number of advantages:

1. The incisions are sharply limited;

2. Compared with electrocautery, coagulation necrosis affects only a narrow band of cells, while no other destructive or ionization effects appear in the surrounding tissues;

3. The cutting instrument does not touch the site of the operation, which results in high sterility of the incision;

4. The incision does not hemorrhage, because hemorrhaging ceases in the capillaries at the time of the first pulse (the so-called "microthrombotizing effect");

5. Rather severe hemorrhage can generally be stopped by means of a defocused beam;

6. The depth at which the laser radiation acts can be controlled, for example by choosing the speed of incision, by changing the laser power, by shifting the focus and the like;

7. Healing of incisions is excellent, with high resistance to common infections and with minimum occurrence of keloid scars;

8. It is possible to perform microoperations which were impossible with classical instruments, which is particularly important in neurosurgery, otorhinolaryngology and the like.

4. The Articulated Arm of the Czechoslovak CO_2 Laser Scalpel

In order for the laser which produces the initial beam to be usable as a surgical instrument, it is necessary to use a transmission device which makes it possible to transmit the laser beam to any location in the operating area. Fiber optics can be used for radiation in the visible region, but for the CO_2 laser, which radiates in the infrared, no suitable fiber optics exists, and accordingly it is necessary to use a mirror optics system organized in the so-called "articulated arm" to guide the beam. This arm, whose output end is held in the surgeon's hand, along with the laser and the focusing system, constitute the laser scalpel. The articulated arm consists of tubes of suitable length which are connected by rotating joints containing reflective mirrors, making it possible to turn them relative to each other around the optical axis. For ease of manipulation of the scalpel, the entire system is balanced. The articulated arm ends in a replaceable extension which the operator holds in his hand during the surgical procedure; its diameter, length and design depend on the optical system, the nature of the surgical procedure, and patient and operator safety. In use with experimental animals, the extension used had a maximum diameter of 20 mm. and its output section was provided with a "guiding contact," at the tip of which was the maximum narrowing (the focus) of the beam, as required for a sharply limited incision. To remove the waste products produced during the cutting of tissue, either the interior of the articulated arm or a tube of synthetic material is used as a passage for compressed air or nitrogen from a small portable cylinder.

In work with any laser it is necessary to protect the vision with suitable protective eyeglasses containing special glass. Thus far there is no universal type of glass which can protect the vision from all wavelengths without reducing visibility. It is an advantage of the CO_2 laser that ordinary glasses containing plexiglass or diopter glass can be used to protect the vision from its radiation.

5. The Laser Base in Czechoslovakia and Possibilities for Production of the Czechoslovak CO_2 Laser Scalpel

Currently the main producers of lasers in Czechoslovakia are:

1. The Research Institute of Vacuum Electronics in Prague (TESLA VUVET), which produces a large number of He-Ne lasers for the construction industry, for mines and for other production and research organizations. The VUVET production program also includes the production of a CO_2 laser with the production designation of TKG-241, which will have a radiative power of about 60 watts, but the length of the laser tube (2,300 mm) somewhat complicates placement of the laser in the operating room. Intensive development of short CO_2 laser tubes (1,000 mm) is currently under way, which will make it possible, for example, to place the laser in a vertical position in combination with the power supply.

In addition to gas lasers, VUVET Prague's production program also includes solid-state lasers, particularly a ruby laser in various production modifications and with various output powers. A neodymium YAG laser has also been prepared for production, and will expand the possible applications of lasers in other biomedical fields.

2. The Institute of Instrumental Engineering of the Czechoslovak Academy of Sciences (UPT CSAV) in Brno has produced a number of He-Ne lasers with radiation outputs of 6, 40 and 85 mW, operating in the fundamental transverse mode (TEM_{00}). Production of these lasers has been assigned to the Metra Blansko national enterprise under the type designations LA 1003, LA 1002 and LA 1001. These types of lasers may find application in dermatology, oncology, laser acupuncture and the like.

3. During the Seventh Five-Year Plan, the Meopta Prerov national enterprise will also be producing certain types and series of gas and solid state lasers with various radiative powers. We may assume that Meopta Prerov will also be producing the separate optical parts needed for the use of lasers in holographic interferometry and the like.

We obviously may conclude from this brief summary of the laser production base in Czechoslovakia that we can count on a developing components base in Czechoslavakia for further modifications of the Czechoslovak CO_2 laser scalpel and for the manufacture of other laser instruments for experimental and clinical use. Small-series production of the Czechoslovak CO_2 laser scalpel can be begun practically instantaneously at the Development Laboratories and Shops of Palacky Univeristy, whose organizational structure and facilities guarantee high quality products.

6. Conclusion

As became clear during the National Seminar on the Use of Lasers in Medicine, and of course through the rich discussion during the seminar, there is great interest in the use of the extraordinary properties of laser radiation in the biomedical fields. It was also universally stated that we cannot content ourselves with the current status of the surgical instrument base, which is not in line with current world trends as far as lasers are concerned. As shown by results from foreign organizations, where the laser scalpel has already found a solid and justified place in clinical practice, a surgical procedure can be carried out with short pulses of laser radiation without anesthesia and even in outpatient conditions, a fact which is of great national economic importance. At the same time, the entire operative procedure can be carried out practically without hemorrhage, because the laser scalpel makes possible coagulation in the blood vessels.

Laser equipment produced by certain foreign companies for clinical practice is extremely expensive, and in some cases an embargo has been declared on it (laser scalpels using CO_2 lasers). Moreover, to give an idea of the high purchase price of a laser scalpel abroad, we note that currently it costs about 150,000 West German marks, or $50,000 to $80,000. In comparison, the purchase price of the Czechoslovak CO_2 laser scalpel, produced exclusively with domestically-produced components, is about Kcs 150,000. When a larger number of such laser scalpels is being produced, we may expect a considerable drop in their purchase price. This will make it possible to provide this efficacious laser radiation not only to the medical faculty and kraj hospitals, but also to other selected health organizations.

As indicated by the proceedings of the First National Seminar on the Use of Lasers in Medicine, and by work done with experimental animals using the Czechoslovak CO_2 laser scalpel, this laser is ready to begin clinical practice. It would be possible to set up a training unit at the First Surgical Clinic of the Faculty Hospital in Olomouc, with the possibility of further close cooperation with scientific and technical workers in the Department of Precision Mechanics, Optics and Optoelectronics of the Natural Sciences Faculty of Palacky University, where the first Czechoslovak CO_2 laser scalpel was developed and fabricated. This organization has had long-standing, rich experience in the development of various optical, optomechanical and optoelectronic instruments and equipment. Other than the Laboratory of Optics, it is the only organization of this type in Czechoslovakia, and in it is assembled the greatest scientific, scientific-technical and technical contingent in the area of precision mechanics and optics. The complete production documentation for the Czechoslovak CO_2 laser scalpel is ready for production. The facilities and of Palacky University's Development Laboratories and Shops guarantee that it will be possible to manufacture additional CO_2 laser scalpels in a very short time, and to furnish them gradually to other selected organizations in Czechoslovakia.

The surgical base of IKEM in Prague, which also has rich experience with experimental use of lasers, and in part with their clinical use, could be another training center. This organization has already been maintaining close cooperation with the Department of Precision Mechanics and Optoelectronics of the Natural Sciences Faculty at Palacky University.

The participants in the national seminar on the use of lasers in medicine received with particularly great satisfaction the announcement of the organizers that starting in the 1976-77 school year the Department of Precision Mechanics, Optics and Optoelectronics of the Natural Sciences Faculty of Palacky University had instituted a separate program in optoelectronics oriented toward applications in the biomedical fields. Under the name of "Optoelectronics in Medicine," this program is elected by 5 to 8 students a year, who begin their own specialization starting in the third year of study. The program is 5 years long and is coupled with a thorough 2-year grounding in mathematics and physics. This preparation of personnel is in accord with the world trend, in which currently the clinical organizations equipped with the most modern equipment, employ not only doctors but also specialists graduated from physics programs who have a basic knowledge of theoretical medical disciplines and profound knowledge of experimental and theoretical physics, optics, electronics, and the design of precision mechanical and medical instruments. This prevents the great national economic losses which would result from inadequate servicing and maintenance of the demanding optical, optomechanical and optoelectronic instruments and equipment.

It is up to the responsible officials in the two ministries of health, Czech and Slovak, to take the necessary steps so that new specialists can be introduced into the work plans of the individual health organizations, and so that alongside the development and expansion of laser engineering and its use in clinical practice, a process of producing workers with a higher education who are capable not only of mastering the highly demanding laser instruments and equipment, but also of repairing them, improving them and developing possibilities for their further utilization is implemented.

The conclusions which were adopted by the participants in the First National Seminar on the Use of Lasers in Medicine in Valasske Mezirici are an objective evaluation of the situation in our health sector. They give a sober evaluation of the current status of foreign experimental and clinical organizations as regards the introduction of lasers into medical practice and indicate the real conditions according to which we can follow worldwide developments in the application of lasers in clinical practice. Now we again remind the two ministers of health of the possibility of immediately beginning clinical practice with the first Czechoslovak CO_2 laser scalpel, and also the possibility of producing additional modifications of it at Palacky University, possibly in cooperation with active utilization of the production capacities of the Meopta Prerov national enterprise.

We can only wish that all the positive preconditions and results of previous experimental stages of application of lasers in the biomedical field will find full and timely utilization in practice. We want this process to be aided by fulfillment of the decrees of the state and party organizations regarding improvement of the services of our socialist health care industry, so as to enable us to take a leading place worldwide.

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BRIEFS

COBALT FROM WASTE--VCHZ [East Bohemian Chemical Plant] in Pardubice began processing resins in 1979. Resins used to be burnt in the past, but now are used as a raw material for production of cobalt, which Czechoslovakia has been importing for hard currencies. According to estimates world cobalt reserves will be exhausted in 40 years. [Prague SVOBODNE SLOVO in Czech 20 Nov 80 p 5]

NEW COMPUTER CENTER--A new computer center became operational at concern establishment SPOLANA in Neratovice. The center, with its Polish-made EC-1032 computer, will facilitate tasks in the areas of work problems, production, maintenance and wages. [Prague RUDE PRAVO in Czech 25 Nov 80 p 2]

CSO: 2402

GERMAN DEMOCRATIC REPUBLIC

ACHIEVEMENTS, POSSIBILITIES OF GENETIC ENGINEERING PRESENTED

East Berlin HORIZONT in German Vol 13 No 28, 1980 signed to press 15 Sep 80 pp 22-23

[Article by Prof Dr D.G.R. Findeisen: "Genetic Engineering: Prospects, Misuse, Possibilities of Genetic Technology"]

[Text] Genetics and genetic research have made broad advances internationally during the past decade, especially through the introduction of new techniques. Modern gene technology is based on one of the greatest recent discoveries in biology--the understanding that an acid (desoxyribonucleic acid or DNA) in cell nuclei contains the genetic material--and also on the discovery of the so-called genetic code. The consequences derived from these discoveries, especially the possibilities of direct manipulation of the genetic mechanism of organisms, including man, by means of genetic engineering, were discussed by experts, among others, in our country in 1979 at the Seventh Colloquium in Kuehlingsborn, on philosophical and ethical problems of modern biological sciences.

Some aspects of this problem should be pursued here, especially the basic features of gene technology and its range of application, the dangers associated with it, and also the possibilities of using this knowledge to benefit mankind.

Basic Features, Function of the Genetic Material

It is known that DNA contains the genetic information of every cell capable of division. The genetic material consists of one or more nucleic acid molecules. Such a molecule can be pictured as a long thread containing "printed music." But instead of the seven basic tones of the octave, there are only four here. These "tones" are assembled on the nucleic acid like the tone sequences of printed music. One can thus compare the genetic setup, or rather the gene, with a melody. And all the melodies of a cell furnish the genetic information, or rather the genome, of this cell. Today it is already possible to introduce genetic information into isolated animal cells to transplant it.

We know, at least since Charles Darwin (1809-1882), that, as long as life exists, there are also interferences with the genetic substance without assistance by man. They occur randomly and bring about changes in the genetic setup leading mostly to genetic defects, and will disappear again with the death of the affected individual. On the other hand, the relatively few useful structural changes (mutations) in a gene will give a living creature better chances for survival than its fellow creatures. Darwin rendered the service of being the first to call attention to these—very prolonged—positive changes in the genetic material through natural selection, in his famous book: "The Descent of Man and the Origin of Species." And it was Friedrich Engels who led Karl Marx to these significant findings of Darwin.

Man learned very early to put to his advantage the methods of selection and not to leave it to the environment alone. While he used it purposefully, grain strains with high yield, domestic animal strains with high meat content, race animals and stud horses, and many others were developed. Until now, the manipulation of genetic material was limited, because desired genetic traits could be achieved only by crossing within a single biological species, for instance, by bringing together suitable breeding animals of a particular race. These limits to a single community of species were overcome by genetic engineering. Thus, for instance, by the artificial infection of human cells with a certain virus—for the time being in the laboratory—a life threatening genetic defect can be removed which was not reachable before by any other means.

Misuse, Dangers of Gene Technology

Of course, closely related to these possibilities of influencing the genetic material is the concern whether the work of the so-called genetic engineers could not also present dangers to man. Private citizen-scientists are drawing comparisons with atomic power or with the poisoned gas warfare by U.S. imperialists in Southeast Asia. Wherever it was used, the very dangerous dioxin led not only to defoliation of trees with serious consequences such as aridity and floods, but also to chromosomal changes in numerous individuals, abortions, miscarriages and defective births as well as cancer.

Such concern is understandable in a social system which cannot guarantee at all that the knowledge derived from science and technology will only be used for humanitarian purposes. Therefore, 5 years ago, a conference was set up for leading geneticists from 17 countries, the Soviet Union among them, in Asilomar (United States) and a moratorium was agreed upon which forbade certain experiments until open problems are completely resolved, in addition to urging the elaboration of safety guidelines.

Even if, luckily, some of the fears proved baseless in the meantime, according to the current view, the closer the gene donor is to the human species, the greater the possible risk estimates should be. Accordingly, genetic material from mammals carries considerably greater danger than those from plants, unicellular organisms and bacteria. In the GDR, recommendations were made according to which a commission directly responsible to the secretary of health should determine the safety measures to be provided. Meanwhile, analogous guidelines are also in effect in other countries.

In the Western world—especially since a 1962 symposium in London on the theme: "Mankind and Its Future"—tempers are being aroused by the fantasies of certain science fiction authors. Exponents of the media—oriented less toward information and more toward manipulation, creation of fear and distraction from social contradictions—are engaged in the most contradictory speculations. The future visions of some Nobel prize winners, presented in unconstrained form at the abovementioned symposium, are in part put as absolutes, to conjure up a version of "genetic degeneration of mankind" for which there is no scientific basis; or else to "save the future of mankind" which, in any event, is threatened by an imperialistic atomic war. There are also sensational fabrications involved with the possibility that, by means of genetic manipulation of the human personality, the historical crisis situation of capitalism could be remedied in a biological-genetical manner. An attempt is made to suggest that, through the work of genetic engineers, not only could allegedly existing genetic decline of mankind be avoided, but antagonistic societal controversies could also be overcome.

To sum up, one could skirt around necessary social changes in this manner. But the social essence of man demands social activities first of all.

How Timely Is 'Cloning' of Man?

This question is posed here on principle, disregarding the erroneous ideological, culture-pessimistic and unscientific position of those who advocate the "cloned" man (cloning=using asexual reproduction starting with a mother plant). According to the conviction of competent molecular biologists, manipulation of the human genetic material with a resultant change in personality certainly will not be possible for 50 to 100 years, if at all. Yet, by that time, social conditions will presumably exist in the whole world which will make it unnecessary to want to use gene technological methods for solving problems which must definitely be approached on a social level. Today, "man made to order" seems more within the realm of possibility of current basic research. But the required experiments increasingly contradict human dignity and ethical principles. Is it not significant that modern medicine is accused of undermining the health of mankind, by keeping ill people alive and making it possible for them to have children, by precisely those people who completely misunderstood Darwin (social Darwinism)? Since, in their opinion, mankind is carrying a "genetic burden," they offer programs according to which human beings should be raised like domestic animals.

The view of the degeneration of mankind by technical and medical advances is plain nonsense. Thereby, we do not fail to understand that personality is by no means the result of social influence alone, but rather that it represents a very specific image developed from social and biological dialectics.[1]

The well-known Soviet scientist, Academician N. P. Dubinin, has taken issue, in a very clear and unequivocal manner, with the necessity and the possibilities, in the foreseeable future, of improving the genetic programming of today's man.[2] Dubinin recalls that many average people are and will be born to families of outstanding people, that the population masses are the source of outstanding personalities. At the present time, giving in to the new eugenicists (eugenics: improvement of the race) and allowing them to destroy the existing, valuable biological basis of mankind could have the most serious consequences. Thereby, he turns emphatically against the repeatedly and sensationally presented demands of the so-called new eugenics of the Western countries.

While such well-known bourgeois scientists as Th. Dobzhansky, B. Wallace and B. Glass (United States) are also warning against acting with excessive haste, the experimental geneticists presented their programs "for the biological improvement" of mankind. At the basis of this is exclusively the necessity to fit the human organism to the technology instead of the technology to man. The question is justly raised by B. Glass whether it would not be simpler and more reasonable to create the necessary environment and to let adaptation take place—as long as we do not know precisely our own nature and, therefore, are as yet not at all capable of distinguishing between "suitable" and "unsuitable," and between "better" and "worse" genotypes. Indeed the main difficulties and the currently greatest risks of genetic engineering are derived, above all, from the fact that science still knows very little about the genetic foundations of the human personality. One is nevertheless certain: there is no gene for morality. Man will become truly human through upbringing in an environment friendly to humans. It is equally certain that a social and biological unity is manifested in him.

Yet when we accept that, in the foreseeable future, man may be capable of influencing his inheritance in order to eliminate inherited defects, then should he not also be morally justified—under worldwide humanitarian conditions—to influence his own biological advancement? Should it not be the basic premise that, with gene technology, the individual possibilities will be expanded, thereby increasing the freedom of the individual, for instance, through improving the resistance to diseases? Illness is "life inhibited in its freedom," it is a limitation of the "totality of life expressions by man" (K. Marx).[3] Thus, why should it not be ethically acceptable some day, for instance, to eliminate certain skin diseases or allergic asthma by means of gene therapy, or even to influence the development of cancer?

What Is Already Practically Possible and Necessary Today?

These and many other possibilities are today only questions of basic research and not of application. Currently, the tasks of preventive eugenics take precedence and, at the same time, the preparation of gene therapy against a series of genetic diseases is in progress.

Special consideration should be given to the extensive and, at the same time, increasingly differentiated elucidation of the genetic basis of human life processes and the possibility of disease development. Human genetics, above all, is concerned with this. Of the 2,000 diseases known today in which genetic factors play a role, many are curable or at least largely controllable by medication, diet or surgery (diabetes, allergic diseases, clefts of the lip, mandible and palate, among others). The fact that, as a rule, disease is manifested in the interaction between organism and environment, presents mainly social-medical and societal consequences both now and in the future. Four of them will be discussed here.

Genetic Family Counseling, Instruction of Youth

Our human-genetic consultation stations in Berlin, Magdeburg, Jena, Greifswald, Rostock and Neubrandenburg are concerned exclusively with helping people by clarifying individual genetic problems and giving help with family planning decisions. Every one of our physicians here will advise responsibly and, in case of doubt, will involve one of the above-named consulting stations. But it is quite possible that, if a child is desired, they will advise to go ahead in spite of a relatively high probability of it having a genetic disease if that disease can be controlled by therapy. Since gene therapy is simply not yet available to practice and may become applicable to only a limited fraction of hereditary diseases in the foreseeable future, prenatal diagnosis and, if necessary, counseling for abortion are the realistic possibilities and, equally, the medical responsibility rather than holding out hope for an eventual repair of genetic structures.

Care of Genetically Damaged People

The projects achieved especially following the eighth and ninth party conferences make allowance for the circumstance that, for instance, about 7 percent of our children live with some form of organic brain damage in our country. This group of people cannot meet the demands of society, or it can meet them only under special conditions. Under socialist conditions, the medical care, pedagogical training and purposeful guidance of this group of people is possible and imperative.

Sanitation, Purification of Air, Water, Soil

This task is primarily concerned with harmful radiological and chemical factors and must also include the "microclimate" (example: tobacco smoke), along with the testing of all chemical substances which come in direct contact with the human organism and can damage the genetic makeup. In this context, the emphatic demands by socialist countries for worldwide disarmament, especially the prohibition of atomic weapons and their testing, and also for the destruction of chemical, biological and other weapons are of the greatest humanitarian importance.

Contribution To Solve the Problems of Feeding the World

By recombination of genes through plant genetics to achieve useful plants, and by fertilization and modern soil cultivation, a relatively rapid, massive increase in plant protein production per hectare of agricultural land already appears to be possible. Another central point would be the raising of animals with specialized characteristics such as an unusually high milk production or a large meat yield.

In summary, let us conclude that, in comparison to prophylactic eugenics and of the gene therapy possible in the foreseeable future, utilization of genetic engineering to achieve a far greater regulation of the individual predispositions of man and the psychic characteristics based on them appears possible only in the framework of humanistic sciences with considerable participation of Marxist-Leninist philosophy, ethics, pedagogics, psychology and sociology. Such a future natural scientific project, which can be termed "genetic projection" in a positive sense—with reference to the pedagogic "projection of personality" by Makarenko—can be imagined basically only as a part of societal evolution in the mature socialist society. "The prospects of mankind are in the direction of social and scientific-technical progress in its unity.... Such a unity of social and scientific-technical progress will be provided on the social basis of Socialism and Communism."[4]

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PAPERS PRESENTED AT BUDAPEST INTERNATIONAL CONFERENCE ON MINI, MICROCOMPUTERS

Budapest SZAMITASTECHNIKA in Hungarian Oct 80 p 2

[Article by Attila Kovacs: "Mini and Microcomputers"]

[Text] In last month's issue we gave a brief report on the MIMI '80 conference held in Budapest in connection with the use of mini and microcomputers. In this article we want to give an overall picture of the program as reflected in several papers and, in this connection, to give a picture of the most recent achievements affecting the special field.

There were two chief questions at the MIMI '80 conference of concern to experts dealing more closely with domestic applications--what trends can one find in the use of mini and microcomputers internationally and domestically.

I would like to feature among the large number of foreign papers those which dealt with the role of mini and microcomputers in the control of robots, with parallel and problem oriented microprocessors and with multi-microprocessor systems.

K. A. Bejczy, of the Jet Propulsion Lab in California, famous for its achievements in space research, and Dr J. Plander, from the Technical Cybernetics Institute of the Slovak Academy of Science, gave very interesting talks about applications connected with robotics, character recognition and picture processing.

K. A. Bejczy said that we can observe an ever increasing trend in various uses of robots. Modern technology uses robots to extend, increase or replace the mechanical work of the human hand. Thousands of manipulators and robot hands are in use already around the world in nuclear, auto manufacture and other industrial areas. It had been imagined that it would become economical to use robots as a result of the increasing capacity and decreasing price of large computers. This hypothesis was proven false 5-6 years ago when it became apparent that general purpose, large capacity computers could not be used economically to control robots or to assemble the information related to this. These problems can be solved much more easily with minicomputers and even more with microprocessors or with the capabilities in these. The use of mini and microcomputers is a great aid to solving the problems of real time control and remote operation (teleoperator) of robots. The problems of robot control are complex and they can be approached and solved best according to multi-level control chema with divided, hierarchical structure. It also turned out that microprocessors have a crucial role in character recognition. This is the only way to solve ideal character recognition applications in robotics within the framework of real time data processing. Because of the properties and economicalness of mini and microcomputers they will play an increasing role in the area of robotics also, in the development of control and intervention functions and of communication between man and robot. They can be used in many different ways and at many levels in robot control. They can be used at the lowest control level to improve the servo performance of the robots and at another level to realize the logical programs controlling the robots. At the newest levels, for example in task oriented control, the operator can even give the robot "intelligent" (functional) orders. Creating these important functions brings up the problem of research on multiprocessor systems.

Microprocessors make robots economical in the strict sense and make them "acceptable" in industrial applications. But there are areas where robots must be used independent of whether or not they are economical--a nuclear environment, deep sea research, space research, etc. In the developed capitalist countries the auto industry leads in industrial use of robots. It is not unimaginable that robots or robot elements will break into the textile industry or agriculture in the near future.

In the talk by Dr J. Plander we could hear how there is a need for parallel and problem oriented microprocessors with very fast operational speeds to handle the problems of artificial intelligence, character recognition and picture processing. The development of microprocessors and microcircuit technology makes it possible to develop parallel processor systems capable of high speed and transmission which are cheap, flexible and reliable and can be used in many fields.

In a paper summarizing the most advanced achievements the speaker divided the parallel computer systems into the following five categories: vector "pipeline" processors; parallel processor assemblies; associative matrix processors; algorithmic matrix processors; and algorithmic minimatrix processors. The most widely used parallel processors are multiprocessors with a so-called MIMD architecture (Multiple Instruction, Multiple Data stream). Finally the paper dealt with the possibilities of future applications of parallel and problem oriented processors in the fields of aftificial intelligence and robotics.

Several papers dealt with the hardware and software problems in developing multi-microprocessor systems. J. Aspelund, from the Technological University in Helsinki, said, among other things, that while software problems significantly limit the use of parallel processors in general purpose computers these problems are largely absent for special purpose mini and microcomputers having parallel processors.

Other papers dealt, for example, with problem oriented multiprocessor architectures which can be used for speech analysis and synthesis, with how to link a general purpose computer and a multi-microprocessor system, and with a multi-microcomputer system with a universally variable topology.

Of the papers given in the software section five were linked to domestic authors. In a paper titled "An Extended Concurrent Pascal Kernel For a Multi-Microprocessor System", J. Grof, E. Hincs and P. Kacsuk, of the Videoton Developmental Institute, reported on their programming experiences with real time process control tasks in a multi-microprocessor system, describing the architecture of the multi-microprocessor system and the realization of the kernel functions. They also dealt with a microprocessor software technology based on the CDL language which aids the development of large scale programs supporting structured programming; they dealt with increasing the intelligence level of terminals in a minicomputer network and with a user oriented program language prepared with a microcomputer system.

Hungarian experts gave eight papers in the applications section. Among domestic applications we can find a microcomputer system controlling a gas distribution network, the collection and processing of X-ray spectrometer data, multi-channel analysis equipment controlled by a microcomputer, microcomputer EEG tests, etc.

I consider noteworthy several statements of Dr Kohler (Erlangen University, FRG) in connection with microprocessors. Today every single measuring device newly planned and manufactured has built-in microprocessors. A new age has begun for digital voltometers, precision thermometers, electronic counters, signal generators, oscilloscopes and other measuring devices. For example, in the past 3 years Hewlett-Packard has developed about 100-150 new microprocessor, intelligent measuring devices. There is ever increasing use of microprocessors in household machines and vehicles. In his opinion, within 3-5 years, every single new car will have 3-4 built-in microprocessors carrying out various functions. Thus it can be imagined how many microprocessors will be used in this area. According to the manufacturers of integrated circuits it can be imagined that within 5-7 years it will be possible to produce on a single circuit chip a unit corresponding to 100 Intel 8080 microprocessors. The big question is what can be done with such a complex circuit, how it can be handled from the software viewpoint for example, etc.

The round-table talks dealing with the software problems of mini and microcomputers raised the level of the conference.

In his debate initiating talk Dr Lajos Rozsa (of the MTA SZTAKI [Computer Technology and Automation Research Institute of the Hungarian Academy of Sciences]), citing well known sources, said, among other things, that in 1979 trade in 4 bit microprocessors came to 50.4 million units while trade in 16 bit microprocessors came to 617,000 units. According to these same sources many of the potential users of the new generation 16 bit microprocessors do not understand how to design systems using such complex units. Writing the very complex unique user software is a serious problem. The round-table talks brought up processing using non-procedural languages, which offer great help to users. There are already achievements in England in this area (the BADSOCKS language). Several mentioned the importance of standardization; this must be realized at the level of manufacture. Standardization is also important in such areas as, for example, the linking of multi-microprocessor systems. One can distinguish two types of users of microprocessors--the manufacturers of so-called OEM devices, who build microprocessors into their own equipment, and the so-called final users who want to use them as a sort of "black box" and who have no experience in computer programming. The situation still is that the majority of microprocessors can be programmed only in the ASSEMBLER language. It would be much more convenient for the final users if they could work with more "humanized" instructions. Recently consultation offices have been opened in the countries leading in the manufacture and use of microprocessors; the problem with these, for the time being, is that they represent the manufacturers rather than the users.

There are signs that within 3-5 years there will be a large number of 32 bit microprocessors on the market; these will have a capacity equivalent to a contemporary minicomputer. Naturally it can be expected that these microcomputers will be programmable in FORTRAN, COBOL, PL/1 and other high level languages. It may be that within 5-8 years these units will have their own translator programs realized as hardware.

At the end of the conference I asked several experts how they evaluated its level.

K. A. Bejczy: "One can find the themes figuring here at other conferences also; the papers of the experts from Hungary and other Eastern European countries reflected advanced thinking. I am thinking here of the problems of distributed or multiprocessor data processing. I see a difference, in comparison with other conferences, in that there, there is a large and fairly well defined market behind the participants. Comparing the participants here with the participants in other conferences one can find a similarity in the fact that dealing with computers is a personal adventure for all of them."

H. Kohler: "The professional level of the conference corresponds to that of other Western European conferences but in regard to the themes of multiprocessor systems the level of the American and Japanese conferences is higher. Technical-scientific applications were in the foreground here. In this area we heard of many new, interesting applications. We could not expect at this conference an answer to a uniform solution of the general software problems affecting microcomputers."

All in all, the MIMI '80 conference held in Budapest--even if it could not give an answer to all the most important problems connected with use of mini and microcomputers--was useful from the viewpoint that it permitted a comparison of domestic achievements and problems in the manufacture and use of mini and microcomputers with the achievements and problems in this area of countries playing a leading role, permitted a comparison with the possibilities of the future.

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HUNGARY

PROPAGATION OF COMPUTER-ASSISTED TECHNICAL PLANNING DISCUSSED

Budapest INFORMACIO ELEKTRONIKA in Hungarian No 5 pp 244-247

[Article by Ivan Nagy, an engineer of the National Technical Development Committee (OMFB): "The Tasks of Domestic Propagation of Computer Assisted Technical Planning" (on the basis of the draft conception OMFB 16-7662 Kt)]

[Text] Computer assisted planning received great impetus with the formation of the AMT [automated technical planning] work group created on the basis of a resolution of the Intergovernment Computer Technology Committee. Hungary has undertaken a significant part in the work of expert conferences dealing with electronic, electrotechnical, machine industry, construction industry and general AMT questions. The article contains several themes of the draft conception for propagation of computer assisted planning. (Received 26 June 1980.)

Introduction

The scientific-technical revolution has accelerated the development of products and of technological processes; as a result of the variety of them is increasing at a great rate. Products and technological processes must be replaced more quickly, and this increases the need for work connected with preparation. This phenomenon makes it necessary to increasingly include in technical planning the methods of computer assisted planning in order to ensure the economicalness, utility and marketability of products.

The accelerating innovation process and, as a result, the necessity of modernizing the product structure and of the development of specialization have led worldwide to a great increase in technical planning. The spread of computer assisted planning methods is made necessary by the growth process and is made possible by the tools of computer technology.

The economicalness of products or construction solutions is greatly affected by the circumstance that computer procedures make possible the working out of alternatives. The economic comparison of several alternatives makes possible the economic optimalization of them, which can have a very significant effect on production or investments and reconstruction. Computer assisted technical planning--as a result of the technical possibilities in it--makes possible the very desirable planning of several alternatives, or mathematical optimalization, without extra throughput time or manpower expenditure.

Planning requires an ever broader information base and swift access to the data of it; this includes the tasks of technical preparation for manufacture also. The planning needs for preparation of production and development are increasing quickly also. Such use of data bases containing technical and economic data places new requirements before the development of these data bases also.

The work required for technical planning is significant in quantity also. As a result of the constant increase in quality demands being made of planning this quantity increases quickly, practically independent of the growth in production in industry and the construction industry. Since the Sixth Five Year Plan does not prescribe an increase in planning personnel, indeed it even reckons with a slight decrease, the tasks can be carried out only with the technological development of planning, including increased use of computer technology.

In this area we must also pay attention to the developmental trend in other countries. On the foreign market, primarily the capitalist market, one of the factors of competitiveness is a swift transmission of bids and flexible adaptation to the needs of the customer. The desired speed can be achieved with adequate certainty only with the aid of computers. There is already domestic proof of this in the area of construction planning.

The time required to work out a design also has a strong influence on the competitiveness of products because goods which reach the market late lose the character of novelty and are sold at a disadvantage. So in the interest of ensuring a market it is important to bring into harmony the time when products can be sold and the throughput time for the development of newer products; in the contrary case plans for modern products cannot be developed in the throughput time required by the world market. This task can be carried out only with the aid of computer assisted planning.

The complexity of products is constantly increasing and so the effective planning of modern products and technical manufacturing preparations can be less and less realized with traditional methods.

Modern computerized production guidance and process control methods require computerization of the planning phase. We can thus develop automated planning-manufacturing-control (TGE) systems.

In addition, competition on the world market demands paying attention to various prescriptions, an awareness of patents, the availability of parts and subassembly catalogs, etc. which in turn becomes possible via computer assisted information systems. This is especially significant for enterprises selling on several markets, because of prescriptions which may differ from country to country.

In general we can distinguish three stages in the use of computers:

--performing labor intensive, complex technical calculations with a computer;

--computer assisted technical planning; and

--complex computerized planning systems.

The tools available have changed in the course of the development of the methodology for automated technical planning and thus the conceptions have changed also. In the beginning for example--lacking graphic computers--connection diagrams prepared with printers were standardized. Today we should regard an interactive graphic engineering facility as an achievable goal. In the age of expensive large computers making possible only local batched processing small desk computers became very popular; the planner could regard them as his own tools, he could get access to them easily and did not have to use an intermediary. It is now possible to develop multi-terminal systems providing remote data processing and planners can be provided with their "own" alphanumeric or graphic terminals the operation of which is made convenient by ever more efficient software products. The creation of nets is also appearing among the developmental goals. In this way the local small computers can be connected to large computers handling large data banks and complex program packages.

As a result of price changes for smaller computers many planning and university institutions have begun such an orientation (SZM-4, TPA 11/40, DEC PDP 11-line, R-10, R-11), naturally in the multiple user operational mode.

Antecedents

Following the example of developed industrial countries, the use of computers for technical calculations and planning work began in Hungary in the 1960's. Progress was along two lines, partly with the aid of medium computers (GIER, Elliott, Siemens) and partly with the aid of small desk computers (primarily Hewlett Packard, Monroe, Wang).

Significant developmental work began in a few areas after the period of initial testing, and several focal points developed. Such an area was the designing of electrical circuits, primarily the computer planning of NYAK's (printed circuit sheets). Several research institutes and university faculties developed programs for this purpose. This work created a base for the development of a larger, more comprehensive planning system.

In the machine industry developmental work began in the area of technological planning in connection with the spread of NC [numerica-ly controlled] machines. Simultaneous with this there developed a conception pointing toward integrated manufacturing systems. Since tools making possible modern, graphic screen, interactive planning were not available researchers began to develop a group of their own tools.

In the construction area the themes cultivated for the longest time were connected with static calibration, which then spread to construction machine planning and the computerized planning of construction systems. Since accessible computer types were not developed, a development in two directions was decided upon. In the first place a large (medium) computer was set up as a central computer for branch planning and in the second place small computers were made available to provincial planning institutions. Program development began in both directions. At the same time computer assisted planning began for road, railroad and water engineering construction. Significant results were achieved in the planning of the metro.

Developmental work was done in a number of special areas also, which was called on to satisfy the needs of individual institutions. These were used in chemical industry and food industry planning, theplanning of lighting and electric networks and machines and the planning of machine elements (for example, cog-wheels). In addition to technical calculations there were computer assisted calculations of investment economicalness and budget management work.

The computerisation of several unique special areas began also (for example, geodetic work and preparation of maps).

Activity in the Area of the SZKB [Intergovernment Computer Technology Committee]

The coordination and central support of research and development work received a great impetus with the formation of the AMT work group in 1974, on the basis of a resolution of the SZKB. Counting on international cooperation and division of labor, very lively work began in Hungary in three or four special areas. The initiation of the work was favorably influenced by the fact that at that very time we were finalizing this part of the Fifth Five Year Plan of our homeland and so it was possible to realize a central influence. The Special Computer Technology Research Program prescribed the functioning and coordination of the chief areas of AMT. Thus, among the general themes of AMT, they decided on a detailed working out of questions connected with AMT instruction. An AMT instruction committee was formed and preparation for AMT instruction, or the training itself, began in several technical universities.

Computer assisted technological planning and manufacturing preparation became an organic part of the technological development of the Hungarian machine industry. The plan included preparation using MSZR [Minicomputer System] as well as ESZR [Uniform Computer Technology System] computers. Our local conditions and the developmental ideas of our machine tool industry placed the emphasis on the area of metal cutting operations. General software development work began to develop monitor systems and to facilitate strength calculations within the frameworks of the machine industry AMT.

In the construction industry AMT we should mention among the architectural engineering themes the planning of the structure of large panel buildings, the planning of heating and ventilation systems for industrial buildings of a given volume and, among civil engineering themes, the planning of highways and girder and frame bridges.

Within the framework of electrotechnology AMT Hungary undertook a significant role in the areas of designing electronic circuits, cards and filters. It is chiefly responsible for developing program packages for circuit analysis, logical simulation and program packages carrying out a number of similar tasks.

Activity dealing with the automation of the planning of computers is also being done within the framework of long-range research work.

To prepare for medium-range planning the OMFB has worked out several studies and one draft conception for the propagation of computer assisted technical planning.

The AMT work committee of the SZAT [Computer Technology Applications Development Society] was formed this year, creating an official domestic forum for the coordination of work being done in various areas and for the debate of developmental plans. Its work plan includes, among other things, attending to international cooperation, compiling registers of user program packages and making proposals for programs to be imported.

The effect of computer assisted planning is spreading to the development of manufacturing and control also. They are developing TGE systems (for example in the electronics industry) and CAD/CAM (computer aided design/computer aided manufacture) systems (for example in the machine industry). Computer management of budgets represents a great aid in construction industry production guidance and they are developing computer data banks for construction systems which can be used by all those interested, from designer to contractor.

The growth in the feasibility of computer construction, the increase in the performance/price index and the increase in user needs and expertise provide a good foundation for the spread of computer assisted planning. Despite the fact that thus far economic profit can be demonstrated for few industrial applications, the first convincing results have appeared already in the undertaking of export deliveries.

Selection Criteria

In selecting areas to be developed and in setting research and development goals we are taking into consideration the following criteria:

—Technical necessity for technological reasons. These are areas where the traditional planning methods can no longer be used. This includes, for example, the design of integrated circuits.

—Increasing economic competitiveness. These are areas where it is necessary to shorten planning and manufacturing times in order to preserve market competitiveness. This includes, for example, the ship building industry and the electronics industry.

—Planning more economical designs. In these areas the more precise computer calculations make possible the production of material conserving and energy conserving designs, equipment and products. This includes, for example, architecture, bridge construction and the manufacture of hoisting apparatus.

—Preparing a large volume of plans in a short time. In these areas an economic basis is provided by the need to solve the limitations set by finite manpower capacity and to adapt to the consequences of work peaks. This includes, for example, the planning of installations, where a large volume of blueprints and estimates must be prepared in a short time. For example, when a series of axonometric pipeline drawings must be prepared.

—The necessity of preparing plan variants. Preliminary economic calculations for investments must be prepared in a number of variants in order to prepare for decision making. It is useful to do this work, which requires many data and calculations, with a computer. In the course of technical planning it is possible to calculate several variants, develop various designs and seek the optimum.

—The technical development, importance, intellectual preparedness or receptivity of the given area, the developmental capacity available and the possibilities given by the assets.

Application Areas

The long-range developmental conception reviews the several special areas and provides guiding principles for development. Taking the application areas in turn, and without trying to be complete, let us list the chief goals.

1. In geodetic and cartographic planning we want to spread the technology of digital map preparation. We are planning to use the micro data bank technique for this. Fitting the survey methods to computer data processing is an important developmental theme. This included automatic interpretation of air and space photography.

2. In regard to civil engineering tasks we are considering primarily the development of computerized techniques to aid transportation and public utility network planning by developing interactive, complex program systems. In the area of structure planning we want to achieve interactivity of dynamics calculations and a simplification of multiple stage calculation methods.

3. In the area of building design the automation of construction systems will come to the fore. An officially coordinated program library, control rules and approval procedures must be developed for this. The development of the complex planning programs begun in the present plan period will be continued and we plan to spread them. In the course of development we must take into consideration the requirements of compatibility within the computerized guidance systems of the contractors.

The preparation of estimates is a phase of both civil engineering and architectural engineering planning which requires significant work. The computerization of this phase is going forward with great strength even now and it must become general after the conditions have been created.

4. The coordination of developmental work being done in a number of places is the most urgent task in one area of machine industry planning, product drafting and design. In addition to this the other direction of development is broader use of modern dimensioning procedures, for example use of the method of finite elements. The planning of chemical industry equipment and pipelines will be aided by computers. We have good experiences and developmental plans especially in strength calculations and in the preparation of pipeline plans. In connection with machine industry planning we should also mention the computerization of operation planning and technological planning, which is going forward at a high level.

5. We can regard electric planning as the best developed area in our homeland. The development of planning systems largely based on MSZR computers is going forward with great strength. The import of suitable graphic devices represents a difficulty. The planning systems are being put into industrial plants and hopefully we can even count on economic results in the Sixth Five Year Plan. The system for designing printed circuit sheets, the first to be developed, will

be further developed for designing integrated circuits and equipment. In the area of the latter the planning of computers is in the most advanced state.

In regard to other electric planning tasks the computerized design of electric motors and distribution networks is under way or under development.

6. In light industry there are domestic experiences and developmental plans for computerized design of patterns.

7. Computer assistance to the manufacturing planning process has begun in several areas. The development of simulation methods to plan technological processes is under way and program systems have been developed or will be developed further for the simulation of chemical industry processes. Work is being done on the several elements of a complex computer system for manufacturing planning (development of a warehousing system, data bank handling system, etc.). For some time already several planning institutions have used computers to do the evaluation calculations for the investment preparatory phase. This includes computer aid for general planning and the development in this direction of the general planning institutions.

8. In the construction area settlement planning and space planning incorporate the most complex technical planning tasks. Computers should be used to assist the planning of new settlements and urban areas, the development of agglomerations, and regional planning because many data and special areas must be brought together. Another characteristic of this activity is that the planned technical system must provide, throughout its entire life, for the functioning of the development and for transformations adapting to needs with a permanent planning character. Such activity includes, for example, a registry of public utilities.

The development of simulation methods is under way in this area also. The development of regional data banks is under way.

9. We are also turning great attention to questions of uniformization, standardization and classification and we are developing planning programs in coordination with the ESZKD [expansion unknown] of CEMA. Circumspect caution is desirable in the area of standardization as a result of the immaturity of the tool system.

A special area is industrial mold design, where we are looking at the possibilities of using computers.

Data Banks

A number of data banks have to be used for effective propagation of AMT. An example in machine industry planning is a store of technological data, which should be developed as a national information center. One of the most important data banks for installation planning is the collection of construction cost norms (IKN), which is the basis for preparing estimates. The question of the data banks needed for planning goes beyond the theme of AMT strictly speaking but their mutual effect will be very strong if computer technology methods spread widely. This also includes the professional literature information systems, but an independent organization, the NTMIR [International Scientific Technical Information System] deals with these.

Tools

An important question in looking at the supply of tools is to forecast the hardware supply. The small computer-large computer competition and the relatively narrow selection of peripherals needed for planning make estimates for any more distant future most uncertain. The hardware devices needed for planning include the alphanumeric CRT terminals intended for general use as well as graphic displays, drum and plane drawing machines, COM [Computer Output Microfilm] equipment and digitalizing equipment. In general we are looking for one large device per planning office and one terminal per planning unit by 1990.

Instruction

The theme of university instruction in AMT occupies a very important place in our thinking. According to our prescriptions conditions must be created in the technical universities so that beginning in 1981-82 every graduating student will be able to get basic information and practice in AMT. In parallel with this care must be taken to create conditions for such training and further training for practicing engineers. The ministry of education is providing state assignments to aid the realization of this aspiration.

It is not difficult relatively speaking to plan general software supply because whatever hardware is obtained there is need for the development and adaptation of special user software. Two difficulties must be overcome in the transitional period. One is overburdening due to basic software deficiencies and the other is to shift developmental work aimed at batch mode processing to the use of the interactive operational mode.

We attribute very great significance to international cooperation in the area of user software. Our homeland is a small country but computer assisted planning is used in virtually every branch. It is inconceivable that we should develop user programs in every area on our own. We want to develop our supply of user programs on the basis of a rational division of labor with bilateral and multilateral international cooperation and the purchase of programs.

A computer technology applications development fund has been established to aid the purchase of programs; a part of this can be used, as needed, to obtain programs aiding technical planning. Naturally we support the adaptation of those programs and systems which can be used by several users.

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MODEL COMPUTER SYSTEM PLANNED FOR PUBLIC ADMINISTRATION

Budapest SZAMITASTECHNIKA in Hungarian Oct 80 p 1

[Text] The meeting convened in September by the Computer Technology Application Committee of the Office of Councils of the Council of Ministers featured discussion of the updating of council case handling, modernization of data processing and the information system and the possibility of utilizing computer methods. At the meeting, the program evolved by members of the Public Administration Organizing Institute for developing a model computerized information and data processing system for districts and counties was discussed by officials of the public administration apparatus and computer and information specialists from the various portfolios. The plan sets forth the agenda for a decade.

The objective is to lay the computer network basis for a regional guidance system making use of the capabilities of computers. It is well known that various portfolios, industrial branches and some county councils have established data banks. However, at present the languages of such computer systems differ. The county computer centers must "speak the same language."

One important task of the 10-year work plan is development of model information systems. The need for this was stressed by both Lajos Pesti, deputy director of the Central Statistical Office, and Miklos Raft, deputy director of the Office of Councils of the Council of Ministers who is also head of the office's Committee of Computer Technology Applications. Work on the project will soon begin in Bacs-Kiskun, Heves, Nograd, Pest, Szolnok and Zala counties. These choices were made on the basis of the counties' achievements in computer organization. During the trial period as well as in the future the information and data processing apparatuses of the national administration computer networks, and the computers of the councils as well as those of the various portfolios will serve as the computer bases of the system. A detailed work plan for the program is to be completed by the end of this year. Implementation is expected to reduce administrative work, result in flexible handling of cases while feedback of council information should improve the standard of planning, management and administration.

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UPCOMING TASKS OF ELECTRONICS INDUSTRY

Budapest MERES ES AUTOMATIKA in Hungarian No 9, 80 pp 325 - 329

[Article by Istvan Littvai, deputy minister of metallurgy and machine industry, speech delivered at Fifth National Conference on Electronic Instrument and Measuring Technology, 18 March 1980, as the opening address: "The Upcoming Tasks of the Electronics Industry"]

(Text) The purpose of the Conference is to appraise the development achieved within the area of this subject matter in developing and manufacturing domestic electronic instruments since the last conference and to become familiar with new achievements. Even the trend of the groups of subjects during discussion for the Conference indicates the development which has taken place in this field in our country in developing modern measurement instruments and systems. The subject matter is current, important and interesting, and proof of the interest aroused among specialists can be seen from the large number at the Conference. Approximately 300 specialists will take part in the reports, discussions and round-table debates.

The idea of development of the electronic industry is based on predicted trends. Such predictions are developed by the OMFB [expansion unknown], the KGM [Ministry of Metallurgy and Machine Industry], and other agencies which have elaborated the directions of technology and economic development within the problem area. However, I am overlooking this information for two reasons: first, it is apparent from the agenda of the Conference that you will deal with modern and progressive questions falling within the framework of the predictions mentioned, and secondly I would prefer to use the time available to speak of what must be done, about the implementation of the plans being prepared on the basis of the predictions.

Naturally electronic instrumentation and measuring technology play a role in the major questions of the development of the electronic industry as one of the minor, but very important parts of the industry. The level of measurement technology is not only a measure of a national industry, but it is also one of the determinants in the activity of research development, production and concomitant activity.

The concept of measurement today does not only apply to the idea of instrument taken in the traditional sense, but to the measuring process meeting the rather complex demands of information acquisition and processing. When we speak of the measurement process today, it includes the entire information servicing system from sensors, through data transformation and transmission channels to the processing of the measurement data. It is natural that we must prefer, in accord with our known domestic resources, a complete measurement system in which mental work has the larger part, but we cannot neglect those units which are the basis of the systems and which in particular are marketable. Of great significance is the IEC interface, which has spread throughout the world and with which we can realize accomplishments, as well as other well-known accomplishments, for example the Camac system, each of which has its own proper area of application.

In addition to giving attention to these viewpoints, we must be careful not to examine the road to be followed in economically effective development with a bias. Although the level of measurement technology can be determined to a certain degree, such as in industry activity, this still does not mean that we can solve every emerging measurement technology problem of the entire country with instruments of domestic manufacture. On the contrary we must count on a strong development of internal production systems in the branch manufacturing measuring instruments and tools with the heterogeneous structure of production and technology of manufacturing of today. The proportion of measurement instruments representing simple mass production is dropping significantly, they are oriented toward socialist import procurement, and our domestic cooperative industry will be able to satisfy fewer requirements. The objective, in addition to maintaining the geodetic and geophysical, as well as the vehicle, inspection and nuclear base, is for a large part (two or three of the cooperatives of major capacity) of the current manufacturing base of our instrument industry to be converted into instruments and instrument assemblies characteristic of complex electronic measurement technology representing a great deal of mental value. These can also be counted on to a greater degree for utilization of computer technology results, as well as with respect to applied and manufacturing technology. A definite area of technological measurement installations (possibly with respect to licensing) can be applied to eliminate capitalist imports intended for domestic investments. The degree to which this goal is achieved also determines the dynamics of development.

Within the scope of an article it is not possible to deal with ideas in detail, but only to outline them. Even details cannot be presented reliably, because they naturally require more elaboration afterward. Technical experts can perform unusually valuable service in this regard by dealing with the economic reality of technical questions in their discussions on this matter, while constantly keeping our resources in view. Along with the data, such questions should be given attention as marketing barriers, import procurement, and so forth, as well as the advantages which come into the program through the development of uniform installation and measuring technology in the branch manufacturing communication technology, in which the specialized field of the Conference discussions can seek and play a significant role.

Similarly it is worthwhile to devote some attention to the developmental trends expected in other areas of the electronic industry. The current mechanical realization of the cash register product group will yield to an electronic solution, based on computer technology results, which will give the system an increasing amount of freedom.

We can count on a significant increase in production dynamics in the area of medical instruments and equipment. It will be possible to expand the delivery of complex medical systems to the primary consumer level. The proportion of electronic products in the automated, controlled technology branch of manufacturing will increase, and the use of computer technology in these systems must be constantly expanded.

These objectives refer quite directly to the individual areas of the electronic industry, but an area constantly broader than the desirable changes in the structure of the electronic instruments must be taken into consideration.

It could be thought that this is a task without a solution, because measurement is connected with every branch of the national economy, industry, agriculture, communication and so forth. In truth it is possible to find some emphasized developmental tasks, emphasized because of their national economic importance, and these can obviously be given preference if this corresponds with the already mentioned conditions. The criteria are constant, so that first we are dealing with complex measurement systems, and within them modules which can be put to use in reliable measurement processes for routine examination under laboratory, diagnostic and observation conditions. It is particularly valuable to mention the very demanding research instruments with which many research positions in higher education, academies and industry, from the Budapest Techical University to the Central Physical Research Institute, are operating.

Let us look beyond these to the signposts which have already been set up. Among these the most important are the following: National Central Research Developmental Plan, commonly known as OKKFT from its abbreviation, the various Central Developmental Programs and the technical developmental priorities. I do not wish to enumerate all of them, but some are worthy of special mention.

Among the topics of the OKKFT are, for example, aluminum metallurgy, machine manufacturing technology, other agricultural and food industry topics, complete electrical energy and industrial systems designed for export, drugs and pesticides, and so on. Five OKKFT subjects are closely associated with the electronic industry:

-- Computer technology manufacturing and application subjects,

-- Microelectronic components, and

-- Communication installations and automated tools and systems.

These latter subjects show the emphasis in support of the main developmental questions of the electronic industry from the research and development side.

The electronic industry also plays a very important role in the central developmental programs, much fewer in number, first its computer technology components and secondly its electronic components, which are in the process of development by means of a partial assembly program which will be spoken of below. If we were to make more comparisons between the OKKFT topics and the central developmental programs, we would find more examples of clearly recognized connections. For example, the subjects of drugs and pesticides can be found not only in OKKFT, but also in the central developmental programs for drugs, pesticides and intermediate manufacturing. Among the technical developmental priorities we can also find some which are important from the viewpoint of the electronic industry, namely automation, provision for components and partial units, and the development of complex systems.

It would be naive to think that even owning a complete list of the various emphasized products would make it possible to outline the sequence of types of electronic instrument and measurement technology to be developed, but there is no need of this. We know, not only from the instrument catalogs of the international companies, but in a careful way from the directions of measurement apparatus and measurement systems in preparation and development in our country, the wide range in which modular developmental systems can be used, by developing single or several newer modules in newer areas of application and integrating them into a system. I would not like to make it appear that this concerns only measurement systems, but, as I have already mentioned, it also concerns objects representing a great deal of mental value, objects which can be single technological instruments for a definite purpose. I do not wish to keep repeating this, but I do want to protect all of us from a one-sided attitude which could be of unprecedented danger in planning a developmental strategy.

When we speak of a certain degree of standardization, naturally a reasonable one, of measurement apparatus, families and systems, it is not sufficient to examine it only from the viewpoint of a rather narrow sector, but rather within the scope of the entire electronics industry. It is not necessary to go into detail on this point here, since I shall later outline the deficiencies of the current situation, and you can easily deduce the necessary and possible implications. Standardizing components and partial assemblies is a question which involves the entire electronic industry more closely than in the past.

The thought of development of types, standardization and normalization, as an effectual instrument to increase efficiency, does not refer to hardware alone in your area of specialization. The large mental value, which we have established as a direction to be followed, does not appear in hardware alone, since software often bears a significant and frequently decisive weight. Therefore it cannot be surprising if I stress the idea that software development specifically requires disassociation from parallel work, and the application of results achieved by others. This is not a new idea in the sense that we are dealing with it. Efforts have already been made in the interests of using microprocessors and high level languages to reduce the prime costs of software products. Software questions still appear in some national programs, but we are only at the beginning and far from comprehensive solutions. At any rate this Conference can be a forum for this question and assist in developing an attitude striving for unity and cooperation.

Every decision must be based on deliberate technical and economic examinations which take into consideration the marketing possibilities as well as the research and development, planning and manufacturing tasks. The question as to what is needed for the complex and therefore expensive instruments has not yet been settled. Market research, customer service and feedback from them is basically important, but the largest international companies today are focusing on well-established service networks, along with constantly improved reliability of components and installations, in their marketing work. I do not wish to spend more time on this question, since everyone knows it in theory, but consistent fulfillment of it is necessary. Good examples already exist in practice but this is not enough, and it should become the general practice.

After these matters, it will be worthwhile to speak in a little more detail about our current domestic reality. What I want to say here refers to the entire electronic industry and is not specific to a technical branch, and what has been said so far could hardly be termed so anyway. Let me state that I will deliberately speak only of those phenomena where there are things to be improved.

-- The technological level of our electronics industry is significantly behind the international vanguard. After the development in computer technology manufacturing which took place in the Fourth 5-year plan, the current plan period provides for further development in only four areas. However, these are only preliminary bases for the development of modern electronic technology. In addition to the lack of developmental resources, our technological development will be basically affected by the fact that no inter-enterprise contacts have yet developed in our country to make standardized implementation of the technological integration necessary in the electronics industry possible. The main reason for this is that the production of the Hungarian electronics industry is approximately one-third to one-fourth that of the developed western enterprises.

-- The structure of the products from equipment manufacturing are exceptionally heterogeneous, and the necessary structural relationship between them, necessary to form a product system or a product family, does not exist.

-- Research and development efficiency is generally low, there are no uniform developmental principles, the transition time is long, brain power is divided among many developmental subjects, and at the same time identical developments are being conducted at different places.

-- Decentralized, directionless development has produced structural elements, equipment and partial assemblies differing with respect to factory and production, and every enterprise has outfitted itself for their vertical production.

-- Industrial standards and a useful assortment of electronic components have not been developed, and therefore three times as many varieties are used as would be justified on the basis of foreign experience. This causes serious concerns about acquisition, delivery and stockpiling.

-- The structural deficiency and the deficiencies in the assortment of equipment and components have increased the parallel technological nature of the industry, although it is exactly the new technical directions which make the development of technological specialization and the basis for common equipment and partial assembly manufacturing possible through the industrial technological expertise.

-- Because of the lack of interest among the enterprises the unjustified parallel manufacture of finished products has not yet been discontinued.

-- It is more and more possible to sell communication, computer, medical and automated installations in a complete system. Except for a few enterprise capabilities (for example, MEDICOR), the planning, shipment, contracting and servicing of complete systems has not been settled. The reason for this, in addition to structural problems, is the lack of interest and the isolation of the enterprises.

-- The level of marketing work differs greatly from one manufacturing branch to another. It is greatest in those manufacturing branches where collective marketing apparatus is available, but even the highest level is below foreign levels.

In various forums with leading experts in the professional scientific and technical areas and in the enterprises we appraised the inconsistencies between the developed position and circumstances, and saw with great concern the emergence of a risk of backwardness and decline in the specialized area.

The contradictory situation appearing in the development of the electronic industry was visible earlier, and a technical and economic concept began to develop with the aid of interested MTESZ [Federation of Technical and Scientific Associations] associations, which I take pleasure in thanking here.

It follows from an appraisal of the situation outlined here that, despite the current organization, technological level, readiness to cooperate, ability to collaborate, marketing work and large-scale unification of partial assemblies characteristic of the electronic industry worldwide, the developmental opportunity of the domestic branches of electronic specialization would dwindle without the modern structures and component development necessary for this unification. We would not be able to give a rank to those requirements which the long-range demands of the national economy will determine.

Further development can only be conceived in a selective way by suitable concentration of resources. The resources of the enterprises and the national economy are no longer limitless with respect to full vertical development. I have already touched on the question of collective partial assemblies and equipment, but the most fundemental question concerning the entire electronics industry is a solution to the component problem. The area of electromechanical components is also to be included, in addition to the active and passive components.

A real milestone in solving the component problem of the electronics industry was the decision of the State Planning Commission, on the basis of which the Electronic Component Central Developmental Program must be elaborated and submitted to the Council of Ministers by the middle of this year. Those who have carefully followed the large-scale, rapid development following the adoption of the Computer Technology Central Developmental Program can really appreciate its significance.

We shall consider the Program being prepared in its practical steps. Within the framework of the Hungarian Communications Technology Association, but separately, the KGM (Ministry of Metallurgy and Machine Industry) created the Electronics Central Developmental Program Office, under the direct supervision of a deputy minister, with its first task being the preparation of the above-mentioned Central Developmental Program. Within the Program Office, the program preparing working group will primarily perform this task. The "working group" name means that it and the other working groups will work with the initiative of the interested parties. There are two other working groups in the Program Office: the "Component" working group and the "Standardization, Collective Basis" working group. Their area of assignment can be seen from their very names.

As is known, the domestic electronic component industry is seriously lagging behind the internation vanguard. In componentproduction (excepting a few types of components produced in small quantities) the types of components useful for the daily needs of industry and meeting less stringent requirements are determinative. Often the reliability of the components is insufficient. In practice the generation change was accepted only with the manufacture of second generation elements. The third generation, the manufacture of integrated circuits, has still not been solved, and nationalization of equipment measurement has only been achieved through imported elements. The situation in the manufacture of electromechanical elements is approximately the same.

Some special component manufacturing companies, as well as monopolies dealing with the manufacture of electronic apparatus, have available an active technology of component manufacture. Comparison based on examination shows that the size of the Hungarian electronic installation producing industry renders it possible to maintain a modern electronic component industry on a profitable level by using opportunities to cooperate with the socialist countries.

The primary aim of development is an expansion of the large-scale capacity of the semiconductor industry on the level of modern technology. In addition to a broad expansion of the product structure, development is not oriented by type but by technology. An effective exchange of assortments can be developed with the CEMA countries through the implementation of modern technological IC [integrated circuit] element manufacture and an equipment base, by dividing the types of integrated circuits according to medium and high complexity.

The basis for manufacturing passive components and electromechanical elements and equipment (connections, terminals, structural frames), meshing with microelectronics, must be developed. Development in these areas requires a sharp increase in automation and mechanization.

In enumerating the working groups operating within the Program Office, I already mentioned several tasks which must be completed within the scope of the Central Developmental Program in addition to components. In this area we are planning the development and implementation of a standard, typed program (partial assemblies, installation and measurement technology, design-manufacture-control systems and so forth) having a fundamental effect on the efficiency of the electronic industry. The objective is to incorporate approximately 40-50 percent of production in the standardization process in the manufacturing branches of the electronic industry manufacturing installations by the middle of the 7th 5-year plan period, thus after the next change in structure. For this purpose it is necessary to gradually create (or to designate in existing organizations) industrial collective bases and manufacturing plants which can organically insure the production of standardized components, partial assemblies and equipment for the benefit of the industry.

In the industry manufacturing electronic installations and apparatus, with respect to all manufacturing branches, there is an unusually large uniformity or at least a related trait to be found in the area of
-- the structural elements used,
-- the basic technologies and manufacturing instruments used, and
-- the design methods.

One of the key questions in implementing the technical and economic concept spread over these three areas is fulfillment of the standardization program to be imposed on the entire electronic industry. Uniformity must be created for the unnecessary and excessive deviation, and standardization must assure the possibility of gradual suppression of uneconomic, parallel manufacturing activity. To a great degree this will assist in significantly raising work productivity and efficiency.

The advantages of standardization and development of types is that:

-- Serial production will be increased in the component industry and production will become more economic.

-- Varieties of material will diminish, and this will favor the manufacture of other basic materials.

-- Enterprise stocks can be decreased by implementing efficient central stockpiling (material and components).

The manufacture of standardized components, equipment and partial assemblies of a universal nature can be reduced in manufacturing installations and even eliminated in many respects.

-- In addition to maintaining the specific structural element manufacturing characteristic of the manufacturing branch, the production process will be characterized by decisive completion of apparatus and of measurement work. This will have a significant production increasing effect on the level of the enterprises.

-- Technical and technological specialization can be implemented. Everything will be manufactured where personnel, instrument and other conditions are available optimally and with the most economic utilization, or where they can be guaranteed.

Dear Readers:

Many of you already know what I have written about. I ask you to overlook the repetition, but probably not all of you were in a position to become acquainted with the developmental concept of the electronic industry, at least not in such detail. However, implementation of this program is not a task to be finished with mere official routine work. It is necessary to see that something new is being born here, something which demands not just any aid, but the enthusiastic aid of every expert working in this field. Provision for measurement technology and instruments for it, adequate for this industry is waiting for the reader, sometimes by means of research and development on embargoed instruments. The task is not an easy one, but it can be accomplished, and for this I ask the individual support of everyone of you and of the organized social assistance of the scientific associations. Let me now express my thanks to you in advance.

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HUNGARY

BRIEFS

INTERFERON RESEARCH--Plans for producing Interferon for experimental, research purposes were revealed at a press briefing recently held at the Ministry of Health. Newsmen were told that the United Pharmaceutical and Nutriment Factory in cooperation with Hungarian institutes will establish conditions for producing unrefined Interferon. After the necessary inspections have been made, institutes conducting research and testing will be supplied with the necessary material in a year or two. According to the briefing, Interferon has been tested on virus infections such as herpes and rabies with disappointing results. There has been no true breakthrough in the case of cancer although results abroad indicate that certain tumors can be cured provided that they are in the beginning stages. Like all biologically active substances, Interferon has harmful side effects: it causes fever and loss of hair. Although research will continue in Hungary, Interferon will not be marketed in the near future, especially not as a wonder drug. [Budapest NEPSZABADSAG in Hungarian 15 Nov 80 p 5]

BEARING WORKS COMPUTER--A modern high-capacity ES 1030 computer has been put into operation at the Hungarian Roller Bearing Works of Debrecen. The system is part of a reconstruction which was completed at the end of last year. In the past the works farmed out the calculations it needed to make on a commission basis. Such work will now be done on the ES 1030. Initially, the computer will work a single shift but plans call for it to do work commissioned by various factories in the Hajdusag Region. If necessary, the computer will be operated in three shifts. [Budapest SZAMITASTECHNIKA in Hungarian Oct 80 p 1]

MECHANICAL SPEECH RESEARCH--Similarly to technically developed countries, efforts are being made in Hungary to find "computer solutions" to the problem of "talking machines." The research involved is being conducted at the laboratory of phonetics of the Institute of Linguistics of the Hungarian Academy of Sciences. The work is under the direction of Dr Kalman Bolla, candidate. Further information on this work will be published in a subsequent article. [Budapest SZAMITASTECHNIKA in Hungarian Oct 80 p 5]

CSO: 2502

ROMANIA

PROSPECTS FOR INCREASING GEOLOGICAL EXPLORATION DISCUSSED

Bucharest FLACARA in Romanian 2 Oct 80 p 5

[Interview with Dr Iosif Bercea, place and date unknown, by Cici Iordache: "Let Us Fully Trust Our Geologists"]

[Text] Dr Iosif Bercea was born in 1931. He attended high school in Tecuci and enrolled in the University of Bucharest where he graduated from the Geology Department in 1953. He first worked as a geologist in prospecting, and, later, in 1960 as a scientific researcher at a specialized institute. He received his doctorate in 1972 with a thesis that was awarded a national scientific award on the subject "Metamorphides in the Godeanu Mountains." He has published, together with other authors, numerous works regarding the geology of the Western Carpathians and the geological and mineralogical nature of the ultrabasic and basic rocks of the Southern Banat. He has created a veritable school in the field of tectonics using the methodology of structural analysis. In 1974, he assumed the position of director of the Institute of Geology and Geophysics, while also currently being the director general of the Central Institute of Research for the Mining Industry. He is a deputy of the Grand National Assembly and Romania's representative to CEMA's Convention for Research of the Seas and Oceans for the purpose of putting their minerals to use -- INTERMORGEO. He has been awarded the Order of "Scientific Merit," second class.

[Question] We meet again after how many years, comrade director?

[Answer] I think it has been 9 years. I can tell you exactly, it was 1971. I remember because of my son Andrei's age.

[Question] I had gone to Rusea, several kilometers from Vatra Dornei and deep in the heart of the mountains, to write about a family of geological researchers. There was a heavy rain that day and I found you at home, at a very hospitable guest house in the village. Your son Andrei, who was not even 2 years old, was crying because he wanted to go outside, and his mother, Elvira Bercea, who is also a geologist, was cooking a peasant dish and carrying on a professional discussion with... her husband. What were you studying back then?

[Answer] There were three families in the area, spread out over several locations. We were responding to a very important social demand for our country looking for raw materials. We were studying an area of interest for useful substances, specifically for polimetallic sulphides and manganese, as well as deciphering a knot in the geological structure of the Eastern Carpathians that had profound implications for the geological picture and overall orientation of prospecting and exploration activities and for calculating the reserves of the mining industry. At that moment, we were involved in certain important discoveries: the existence of a connection between the region of Fundul Moldoviei and Lesu Ursului and the region north of Balan. We were getting solid information about the location of ore deposits, a very important thing.

[Question] And, it is very difficult to obtain such information?

[Answer] Very difficult. You have to make order out of a mixture of rocks and make new, detailed arguments against an existing geological picture. Deciphering the detailed structure and the stratigraphy of the crystaline schists in the Eastern Carpathians, leading to precisely identifying the location of accumulations of polimetallic sulphides, was a research project of considerable proportions and an essential contribution to the continuation of extraction projects. I repeat, and I want you to remember this, that it was not the Bercea geologists alone that did this, but a grouped made up of six researchers who, by circumstances, were three couples. The other two couples were the Muresans and the Krautners.

[Question] Since at the time you told us quite a bit about Godeanu and the mountains that are the subject of you thesis, how much time have you spent working in the Eastern Carpathians?

[Answer] I would say that I have practically continuously worked in the Eastern Carpathians from 1960 to 1973. Over a stretch between Prislop Pass and Brosteni. The geology of the Godeanu Mountains has fascinated me. It was, as we say, a "pink spot," an area that was not only very isolated geographically, but also sufficiently unknown from a geological point of view. During the span of five campaigns into the area, I brought this area to a modern level of understanding and obtained an advanced amount of scientific information. I uncovered a completely unusual fact, one that was unknown and unsuspected until that time in our country - certain fissures under different pressures within the framework of the same region, a geologic phenomenon encountered normally in Japan, the Pyrennees and North America.

[Question] What importance does this have in a practical sense, for society, the discovery of such an aspect of geological time, such a curosity of nature?

[Answer] A very great importance in deciphering the evolution of rocks and the formations and useful mineral substances. On a scientific level, for the first time we see in the Carpathians, and not just in the Carpathians, but in the Carpatho-Balkan region, the existance of this type of association of minerals.

[Question] In addition to the Eastern Carpathians and the fantastic and unexpected Godeanu Mountains, in what other areas have you been? And, with what results?

[Answer] I was part of a group of researchers that explored the southern Banat region. In presenting the geological and mineralogical nature of the ultrabasic and basic rocks, the research also produced a series of scientific works. The studies made an effective and especially significant contribution to providing the raw materials for producing magnesium. Large reserves of serpentinites were found which contained mineral substances especially necessary to the national economy. Currently, ICECHIM is carrying out research for its complex use, with the later extraction of subproducts and other useful elements, such as nickel, chromium, palladium. In recent years, geological knowledge in our country has experienced broad progress and for some regions, such as the Apuseni Mountains, the Eastern Carpathians and the Banat, there has been a veritable revolution in their detailed analysis. Investigations using ever more complex, precise and modern devices, including satellite surveys, are completing and changing nearly daily the geological picture of the overall and detailed make-up of our country. Currently, we have a level of geological knowledge of our country that is much more advanced compared to other countries in the world. First of all, this is because of the state allocated funds for this scientific sector of activity and the national programs initiated by our party's leadership at the 11th and 12th Party Congresses regarding the development of our own base of raw materials and the higher use of existing minerals still underground in our country. Second, it is because of the research activities in drilling for hydrocarbons, with Romania being one of the pioneers in this field in the entire world. This drilling has provided an impressive amount of information on the diverse underground strata. The maps that our institute draws up and publishes are based upon the virtually exhaustive information stemming from both our own research and the interpretation of the data furnished by the overall geological effort — prospecting, exploration and extraction. As we say, we are continuously bringing up to date the picture of Romania. For scientific reasons and for social purposes, this was also the reasoning behind the 1974 unification of the two institutes — of geology and geophysics. Both fields of research had reached a certain level of cooperation corresponding to the overlapping of data needed to draw certain conclusions with regards to the geological structure of the country and the structure of ore deposits. In this way, we have been able, and are able, to offer those involved in prospecting and exploration a truly scientific basis to more precisely and exactly determine the areas of interest and analysis for useful substances.

[Question] Actually, comrade director, this is the purpose of our visit here today: to find out what is the contribution of research in providing a base of raw materials from domestic resources. At the recent Congress of People's Councils, comrade Nicolae Ceausescu stressed, among the priority objectives, the need to intensify research and use the existing reserves of useful mineral substances throughout the country, including low-grade ores or those more difficult to exploit. How are you responding to this national requirement?

[Answer] Everyone knows the mining projects that have come into operation in recent years! Our research is "behind" these projects. For example, the discovery of the ore deposit at Palazu Mare in Dobrudja is the result of magnetometric research that led to identifying this large accumulation of iron ore, later confirmed by drilling. For the first time, geophysicists were able to uncover it.

In recent years, great progress has been achieved in furthering the knowledge of the potential for useful substances in the metallic ore-bearing mountains in the southern Apuseni, both for complex minerals and precious metals. Here, the cooperation in prospecting and exploration went right through to the production phase, with valuable contributions to increasing the amount of exploiatable reserves. The credit here goes to geologic researchers Mircea Borcos, Ion Berbeleac and Haralambie Savu. The institute directly and effectively participated in drawing up numerous research, prospecting and exploration projects for the principal deposits scheduled to be exploited in the coming five year plan.

[Question] Can you be specific?

[Answer] The entire theme contained in the institute's plan is strictly centered around the objectives of the Directives of the 12th Congress and the Scientific Research Program. As is normal, we have the 1981 plan ready and it is as specific as possible. One of the major themes refers to establishing the areas of interest for primary energy sources - coal, combustible shale and geothermal waters. For the coal and shale we will carry out research in the Eastern Carpathians - Vaii Humorului region; in the Southern Carpathians - Sirinia-Resita region; and, in the Lugoj (Sinersig) Basin, as well as in the Getic Depression, in other words, along the entire Romana Plains (Motru-Cosustea; western Oltenia), and in Transylvania in the Tihau-Cristoltel sector. We are opening up complex research, in geology, geophysics, geothermometrics and teledetection, in the Pannonian Depression (the Western Plains), in the Moesic Plateau and in northern Moldavia, as well as geothermal research regarding the possibilities of using the energy potential of dry heated rocks in the Calimani-Gurghiu-Harghita volcanic chain.

[Question] Fascinating! And, how will you get, how will you bring the heat of these rocks up from the depths, from "the fire in the middle of the earth?"

[Answer] The technical experts will give us the word when the time comes. Right now, the answer is injecting water from the surface. In the experiments that will take place at Calimani, in which we will take part, we will keep track of the temperature of the water that comes back to the surface, the water that has been heated, in order to substantiate the economic chances of using this source of energy. In Japan, it is already being used and we are optimistic that we will succeed also.

[Question] What about thermal waters, which are sufficiently abundant in our country? What energy chances are there? Do you believe in this new source of energy?

[Answer] A great belief! As I have pointed out above, we have scheduled research in this area. We are continuing to study the behavior of the geo-thermal source being exploited at Sacuieni for the purpose of optimizing its use.

Another big chapter in our 1981 plan refers to establishing future areas of interest for useful metal-bearing mineral substances, including low-grade ores. For iron and manganese we have planned research projects using an unusual method of analysis. In the Eastern Carpathians, it will be in the area of Vatra Dornei - Iacobeni; in the region of the headwaters of the Dimbovita River; in the Banat and in Dobrudja (Cirjelari-Altin-Tepe, Baspunar). We are talking about a detailed research at various depths that is based upon earlier studies of the geological structures in the areas I mentioned.

[Question] What about in the field on non-metallic ores? These veritable new "El Dorados" of the modern era, when industries are ever more complex and more sophisticated, and are more involved with chemicals?

[Answer] They have a very great future in our country. And so they must! Some developed countries have already begun to include the level of use of non-metallic substances among the indicators of the degree of civilization. We also have a program in this field regarding the determination of reserves and mineralogical research for these substances. There are studies on bauxite in the Padurea Craiului Mountains, on betonite in Maramures, on salts in the Sub-Carpathians in Moldavia and on sands and quartzite stone in northern Moldavia.

[Question] Comrade director, the Scientific Research Program for the future calls for, as we know, the geological understanding of the floor of the Black Sea and the study of the continental shelf from a mineralogical point of view, as well as participation in research on the world's oceans. What are doing in this regard?

[Answer] Everything that you have mentioned. We are continuing to look for solid minerals in the continental shelf of the Black Sea in the area of Sfintul Gheorghe - Portita. By using a modern geological and geophysical device we will determine the areas of sand containing heavy minerals and, we hope, we will have all the data we need to make a contribution to understanding the configuration of the sea bottom off our coast. At the same time, our researchers will make their contribution to the studies for the placement of off-shore drilling platforms. Beginning next year, we will intensify the geological and geophysical study of the Danube Delta for its mineral potential, starting projects in the Ceatal-Pardina-Tulcea region, as well as in the area of the bends of the Chilia branch of the Danube and the Rosu-Rosulet Depression. Similarly, we have proposed the geo-dynamic complex study of the Romanian coast, an urgent project, for the purpose of protecting it against sea erosion and, thus, protecting the numerous economic and tourist facilities.

[Question] Is there such a danger?

[Answer] Naturally, yes. The phenomenon exists and, if left alone, can give us a surprise over time. Certainly, however, it will not be left alone.

[Question] What about the world's oceans? When?

[Answer] As in other areas of research where we will be dealing with the latest, newest methodologies and technologies, we need to complete our equipment holdings with working devices and instruments. In this regard, we also have a program and the assistance of the National Council for Science and Technology and our ministry, and, in this context, we hope we will be equipped with everything we will need. In order to explore the world's oceans, we need a specialized research ship. We know that we are beginning to get experience in the field of designing and building research ships.

[Question] Yes, at ICEPRONAV in Galati. We are convinced that the specialists there will be receptive to your requests. The first oceanographic research ship, destined for the Institute of Marine Study in Constanta, a ship of Romanian design and a special accomplishment, is a guarantee that you will have your ship.

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